



PROPOSED NEW RAILWAY SYSTEM

FOR THE

TRANSPORTATION AND DISTRIBUTION
OF FREIGHT BY IMPROVED METHODS

IN THE

CITY AND PORT OF NEW YORK

BY

WILLIAM J. WILGUS

ANNEX

SUBMITTED TO THE

PUBLIC SERVICE COMMISSION FOR THE FIRST DISTRICT

BY

THE AMSTERDAM CORPORATION

SEPTEMBER 25TH, 1908

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PROPOSED NEW RAILWAY SYSTEM
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While much has been written during the past forty years on the general subject of freight transportation in the City and Port of New York, but little effective thought appears to have been given to the broad question of the more expeditious and economical handling of freight between the carrier and the consumer. Passenger transportation systems have been steadily improved, but the most archaic and inadequate methods of freight distribution still retard the growth of the commerce of New York, and make increasingly difficult and expensive the furnishing of food and raiment to the vast population residing on Manhattan Island.

Recently the attention of the public has been attracted to the freight problem on Manhattan Island by the controversy that has arisen over the proposed removal from streets and public places, of the tracks of the only railroad that now has direct rail access to the Island.

To arbitrarily remove these tracks belonging to the New York Central & Hudson River Railroad Company, and extending on the West Side from Spuyten Duyvil to St. Johns Park, will solve the question so far as the safety of the public is concerned, but the difficulties of freight distribution and the resultant evil effects on the commerce of the Port will be intensified.

For instance, the abolition of the terminals of the N. Y. C. & H. R. R. R. at St. Johns Park, 33rd Street and elsewhere on the West Side will necessitate the securing by the railroad of equivalent waterfront facilities for handling annually the 5,000,000 tons of freight that now enter the Island by rail at Spuyten Duyvil, and will seriously injure many business enterprises that are important to the welfare and prosperity of the city. This increased use of waterfront space is diametrically opposed to the policy laid down by the New York Commerce Commission in 1900, and by the Chamber of Commerce, that more rather than less dock and pier space is urgently required for the use of water carriers, if the Port of New York is to successfully compete with its rivals.

Therefore, the solution of the freight problem on Manhattan Island is herein approached with the object of securing the benefits of rail connection, not only with the N. Y. C. & H. R. R. R., but also with all other railroads now terminating on the New Jersey side of the North River and in the Borough of the Bronx, with the need for less rather than more railroad facilities on the waterfront where additional space is demanded for the growing traffic of the water carriers, and with improved methods of distribution that will lessen the time of delivery, largely reduce the high terminal charges with which the Port is now burdened, and relieve the harbor and the surface of the city streets from congestion.

The subject is treated under the following headings:

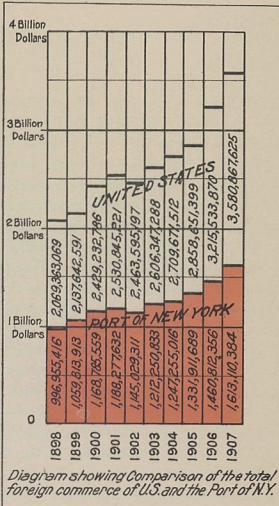
- I.—Commercial Importance of New York.
- II.—The West Side Problem.
- III.—Previous Reports of Waterfront Transportation Facilities of New York.
- IV.—Requirements of Commerce.
- V.—Requirements of the Public.
- VI.—Requirements of the Carriers.
- VII.—Proposed Solution of the Problem.
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I.—Commercial Importance of New York.

The City of New York, with 5 per cent. of the nation's population, produces 11 per cent. of the manufactured products, and acts as the gateway through which flows nearly one-half of the foreign commerce of the entire country.

In 1907 the total imports and exports of the United States were valued at nearly \$3,600,000,000, of which over 13,000,000 tons passed through this Port, valued at \$1,600,000,000.

In manufactures New York ranks first among American cities, with nearly a half million wage earners, representing a dependent population of two and one-half million people, with nearly 40,000 establishments, capitalized at nearly a billion dollars, spending annually for wages nearly a quarter of a billion dollars, and with an annual production valued at nearly \$1,400,000,000.

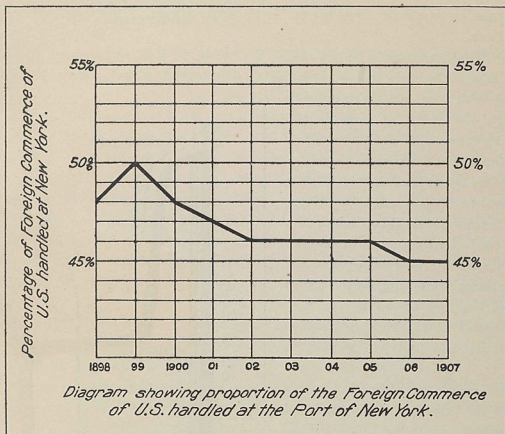


ITEM	1880			1890				1900		
	U.S.	CITY OF N.Y.	% of U.S.	U.S.	% not over 1880	CITY OF N.Y.	% not over 1880	U.S.	% not over 1880	CITY OF N.Y.
No. of Establishments.	253,852	16,923	7	355,405	40	37,163	119	512,276	44	39,776
Capital.	2,790,272,606	251,223,975	9	6,525,050,759	134	622,982,074	187	9,831,486,500	51	921,876,081
No. of Wage Earners.	2,732,595	275,920	10	4,251,535	56	415,552	51	5,314,539	25	462,763
Wages.	947,953,795	120,626,680	13	1,891,209,696	100	236,250,857	96	2,327,295,545	23	245,021,881
Cost of Material used.	3,396,823,549	423,356,534	12	5,162,013,878	52	538,596,570	27	7,346,358,979	42	709,109,412
Value of Product.	5,369,519,191	659,205,230	12	9,372,378,843	75	1,084,850,236	64	13,010,036,514	33	1,371,358,468

Comparative Manufacturing Statistics from U.S. Census Reports.

A still further illustration of the importance of New York is the annual tonnage which, according to testimony before the New York Commerce Commission in 1900, exceeds 100,000,000 tons per annum.

Unfortunately, congestion attending the handling of this vast tonnage is causing a gradual decrease of the rate of growth, and the necessity is faced of improving transportation facilities if the city is to continue to hold its pre-eminence as the commercial metropolis of the country. For instance, in 1899, the foreign commerce of the Port of New York was 50 per cent. of the total for the United States, whereas, last year it was but 45 per cent.



In manufactures the ratio has fallen, for wages from 13 per cent. of the total for the nation in 1880 to 11 per cent. in 1897, and for value of production from 12 per cent. to 11 per cent.

From these data the conclusion may be drawn that, coupled with the great volume of remunerative traffic that is offered to any improved method of freight transit, is the surety of cordial support from the municipality, the shippers and the carriers, of any plan that, by expediting and reducing the cost of delivery of freight, will check the decline in the rate of the city's material growth.

II.—The West Side Problem.

The Hudson River Railroad Company was incorporated by chapter 216 of the laws of 1846, and was consolidated with the New York Central Company in 1869 to form the New York Central & Hudson River Railroad Company. By an ordinance dated May 6th, 1847, and confirmed by a contract dated August 12th, 1847, the com-

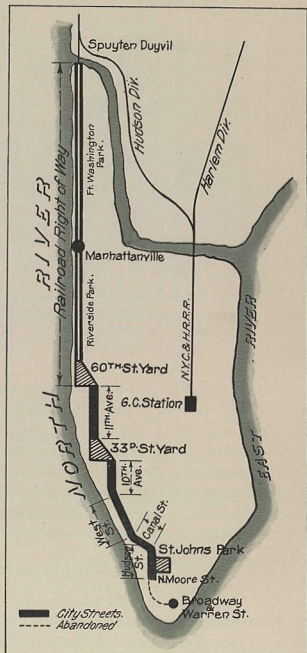
pany was authorized to construct a double-track railroad from Spuyten Duyvil at the northerly limit of Manhattan Island, along the company's own right-of-way on the easterly bank of the Hudson River to the so-called "60th Street Yard," intersecting some nineteen city streets at grade; and thence along and upon the surface of Eleventh Avenue, Tenth Avenue, and West Street to Canal Street.

Subsequently by ordinances dated September 25th, 1849, and December 20th, 1864, authority was granted for extensions of the main line from the aforesaid terminus at Canal Street through Canal and Hudson Streets to Chambers Street, and thence for the use of "city cars" through College Place and Warren Street to Broadway.

At a later date the tracks were removed from the former terminus at Broadway to the existing southerly terminus at North Moore Street in the neighborhood of St. Johns Park.

The double-track main line of the N. Y. C. & H. R. R. R. on the west side of Manhattan Island therefore now extends for a distance of approximately 12 miles (8 miles of which are on the company's own right-of-way and 4 miles in and along city streets), from Spuyten Duyvil to North Moore Street as illustrated on the accompanying sketch. Within this territory there are four large freight terminals, Manhattanville, 60th Street yard, 33rd Street yard and St. Johns Park, in which is handled the large tonnage originating on the 50,000 miles of territory served by the New York Central Lines, destined for local consumption and export at Manhattan Island.

The public opposition to a continuation of the presence of the railroad company's tracks on the surface of the city streets, more particularly Eleventh Avenue, culminated in the enactment of the so-called "Saxe Law" (Chapter 109, laws of 1906), which provided that the Board of Rapid Transit Commissioners, later succeeded by the Public Service Commission, should agree with the railroad company on the depression of tracks into subways in and across all streets, parks and public places from Spuyten Duyvil to the terminus near St. Johns Park, and in default of so agreeing should condemn the property and rights of the railroad company within the limits thereof.



On November 14th, 1906,* the Chief Engineer of the Board of Rapid Transit Commissioners reported that instead of placing tracks in a subway between Spuyten Duyvil and 60th Street yard, it would be preferable to leave them on the present surface, carrying the intersecting streets overhead, except in the neighborhood of Manhattanville where the tracks should be elevated so that the streets could pass beneath. South of 60th Street yard he called attention to the advantages of an elevated structure, but confined his proposed method of treatment to a subway because of the restrictions of the Saxe Law. His estimates of cost, exclusive of land and additional tracks were:

Alternate 1, route along 11th and 10th Aves	\$30,550,000.
Alternate 2, route along marginal way.....	\$34,000,000.

In the early part of 1907 the Board of Rapid Transit Commissioners appointed a Committee consisting of the Mayor, Mr. Jessup and Mr. Smith, to negotiate with the railroad company. As a result they reported on February 25th, 1907,* that the railroad company had agreed to build at its own expense a six-track subway in Eleventh Avenue from 30th Street to 60th Street; and thence northerly along its own right-of-way, widened for a total of six tracks, on substantially the existing grades, with the intersecting streets carried overhead, except at Manhattanville where the elevation of tracks is proposed so as to permit the streets to pass beneath. The sums to be paid to the city by the company for lands required for the widening of the right-of-way for six tracks were to be devoted to the covering of the right-of-way of the company along Riverside and Fort Washington Parks, thus concealing objectionable railroad operations and affording the city increased park area in return for the cost of constructing the covering. Furthermore, the railroad company agreed to abandon the use of steam for its main line freight operations south of Spuyten Duyvil.

South of 30th Street negotiations were deferred awaiting a further examination and discussion between the committee and the railroad company.

These agreements, which had the approval of the Board of Rapid Transit Commissioners, conflicted in several instances with the rigid requirements of the Saxe Law, and a bill having the endorsement of both the Board and the railroad company was drawn and submitted to the Legislature, but failed to pass.

The Public Service Commission, succeeding the Board of Rapid Transit Commissioners in July, 1907, and governed by the mandatory provisions of the Saxe Law, has caused maps to be prepared and referred to the Corporation Counsel with formal directions to commence condemnation proceedings.†

The present status of the West Side problem is highly injurious to the interests of the city, as no progress is being made to abate the nuisance of tracks at grade; and expensive, slow and uncertain litigation faces the two parties to the problem, the city and the railroad company, who are apparently anxious to reach an amicable agreement.

III.—Previous Reports on Waterfront Transportation Facilities of New York.

As early as 1867 a four-track railway on the waterfront was suggested by Wm. C. Bryant, two tracks for passenger purposes and two for freight. Shortly afterwards, W. E. Worthen made a similar suggestion for an elevated railway in West Street from Chambers Street to 23rd Street. In 1874 several members of the American Society of

*Exhibit 12.

†Exhibit 15.

Civil Engineers called attention to the excessive cost of freight transportation on Manhattan Island, and recommended the construction of a belt railroad on West Street. Between 1874 and 1877 the Committee on Terminal Facilities of the New York Cheap Transportation Association repeatedly cited the high costs of handling freight in the Port of New York, and suggested an elevated double-track freight railway on the waterfront.

However, not until 1895 was official action taken by the city to determine what should be done to improve the method of freight distribution. In that year the Department of Docks & Ferries appointed a Board of Consulting Engineers, consisting of Geo. S. Morison, Wm. H. Burr and Wm. P. Craighill. This Board made several reports, from November 11th, 1895, to December 15th, 1897,* in which elevated railway freight access to the piers was condemned and a four-track surface freight railway for the common use of all railroads, with a float bridge at the Battery and an elevated passenger railway, were recommended. These recommendations were discussed at length in the *Journal of Commerce and Commercial Bulletin* between February and March, 1898, and were not received favorably by either the public, the commercial bodies of the city nor the railroads, and nothing was done beyond the laying out and partial construction of wide marginal streets along the waterfront with a view to accommodating the surface and elevated tracks as recommended.

On February 19th, 1903, Mr. William Barclay Parsons, in his report to the Rapid Transit Board, suggested that the West side problem should be solved by substituting for the tracks at grade an elevated four-track structure for freight and passengers, but no further action was taken in that direction.

In 1904 the Municipal Art Society discussed the waterfront problem and recommended:

- (1) Freight subways for foreign and domestic commerce.
- (2) Surface of streets for trucks.
- (3) Elevated railway for passengers.

The Chamber of Commerce has given much thought to the general subject of improved methods of freight distribution. The report of the Committee on Foreign Commerce and the Revenue Laws (Gustav H. Schwab, Chairman), dated December 28th, 1906, refers to inadequate provisions of piers and wharves offered by the city, and advises the adoption of a broad and comprehensive plan for the improvement of the terminal facilities of New York. As a result, the Chamber of Commerce adopted the following resolutions:

Whereas, the commerce of the City of New York is hampered by lack of modern terminal facilities; and

Whereas, this condition, if not relieved, will result in serious danger to the welfare and future supremacy of New York City; therefore be it

Resolved, that the appointment of a special committee of five is recommended, with power to add to their number and report a comprehensive plan for the future treatment and development of the waterfront of New York in its relation to commerce.

The special committee was appointed and made a preliminary report which was adopted by the Chamber of Commerce November 7th, 1907.† This report called attention to the impracticability of the plan offered by the Board of Consulting Engi-

*Exhibit 11.

†Exhibit 13.

neers of the Dock Department; advised against the adoption of an elevated railroad because of its impracticability at the present time; enlarged upon the congestion in the streets of the city caused by the transportation of goods by truck; and deplored the waning importance of the waterfront along the East River, and the increasing element of danger to navigation in the passage around the Battery.

The final report of the Committee on Foreign Commerce and the Revenue Laws, adopted by the Chamber of Commerce January 2nd, 1908,* called attention to the increasing needs of canal traffic for additional open piers; recommended that the policy of the city should in the future cause an increase in the number of open piers as existing leases expire; and concluded by stating:

"Your committee, in presenting these suggestions and recommendations of possible remedies for the relief of terminal conditions as they now exist in this Port, regret that they have been unable thus far to discover any method by which the traffic congestion in the marginal streets on the waterfront might be relieved. This in the opinion of your committee is a subject which is properly part of the problem of the regulations of street traffic, a problem rendered especially difficult by the configuration of Manhattan Island, and by the constantly increasing volume of business transacted in its limited area."

It is, therefore, evident that the necessity exists for a broad solution of the problem of freight distribution on Manhattan Island, and that as yet no adequate remedy has been devised.

IV.—Requirements of Commerce.

The first requirement of a great Port like New York is ample space for the accommodation of water carriers, in close relation to railroads, warehouses and the active business district of the City.

To understand this feature a knowledge is necessary of the extent and usage of the available water frontage near the commercial section of Manhattan Island, as given in the following table:

USER.	North River south of 72 ND St.			East River south of 44 TH St.			Totals.		
	No.	Lineal Feet.	PerCent	No.	Lineal Feet	PerCent	No.	Lineal Feet	PerCent
Railroads exclusive of Ferries.	8	9460	30	6	2680	10	14	12140	21
Foreign Steamships.	12	7446	23	1	137	$\frac{1}{2}$	13	7583	13
Coastwise, River and Sound Lines	16	4084	13	7	3208	12	23	7292	12 $\frac{1}{2}$
Ferries.	10	2132	7	12	3010	11	22	5142	9
Municipal Purposes.	5	1962	6	10	2415	9	15	4377	7 $\frac{1}{2}$
Miscellaneous Purposes	—	6451	21	—	15620	57 $\frac{1}{2}$	—	22071	37
Totals		31535	100		27070	100		58605	100

It will thus be seen that foreign and domestic steamship lines each have but 13 per cent. of the available river frontage; whereas the railroads utilize 21 per cent. for

*Exhibit 14.

the reception and delivery of freight, and with existing methods of distribution will need a larger percentage in the future to accommodate their growing traffic. The canal interests will also require more space upon the completion of the Erie Canal enlargement.

With the available water frontage on the commercial portion of Manhattan Island incapable of enlargement, and with an urgent demand by the water carriers for more room, it is apparent that some method of land carriage must be devised that will decrease rather than increase the need for railroad space on the waterfront. The evidence given before the New York Commerce Commission in 1900 shows conclusively that something must be done to enlarge the waterfront facilities of Manhattan Island if the Port is to maintain its pre-eminence.

A knowledge of the volume and cost of handling traffic on Manhattan Island is essential to an intelligent conclusion. The tonnage that more vitally affects the subject under discussion is the part that requires draying on the city streets. From the carriers and other authoritative sources the following information has been obtained, applicable to the years 1906-1907:*

APPROXIMATE TONNAGES OF THE PRINCIPAL RAIL AND WATER CARRIERS REQUIRING
DRAYAGE IN MANHATTAN:

Carriers.	Merchandise (Tons).	Coal (Tons).	Total (Tons).
Railroads:			
Rail delivery	2,000,000		
Water delivery	7,800,000	9,800,000	4,000,000
			13,800,000
Foreign steamship lines:			
Terminating on Manhattan Isl.	1,400,000		
Terminating in New Jersey...	800,000		
		2,200,000	2,200,000
Coastwise lines (Incomplete)	2,900,000		2,900,000
River and Sound lines (Incomplete)	1,300,000		1,300,000
Irregular lines (Incomplete)	3,000,000		3,000,000
Totals	19,200,000	4,000,000	23,200,000

The cost of handling this tonnage is of vital importance. With the exception of the portion of the New York Central tonnage that is drayed to and from its rail termini on Manhattan Island, all freight carried by the railroads requires lighterage, and break of bulk on the waterfront. The cost of the lighterage in connection with this service was investigated by the New York Commerce Commission in 1900, and was found to widely vary, depending on the class of freight, the method of water transportation and the places of distribution. The average result, however, including interest, depreciation, taxes and insurance on plant and structures, and cost of wages and supplies, was shown to vary from 83 cents to 88 cents per ton. No conclusive evidence was produced as to terminal costs on both sides of the river, including rentals, handling of freight and similar items; but data have been obtained from other authoritative sources. The cost of cartage on the city streets is found to vary, depending on the length of haul and the character of freight. For certain commodities it is as low

*Exhibit 7.

as 60 cents per ton, and for others as high as \$1.25 or more per ton. An average of 80 cents per ton is considered to be a conservative figure.

The following estimates of the cost of handling freight from the outlying yards of the railroad companies west of Bergen Hill, New Jersey, and 60th Street, New York, to the shipper, are believed to be low rather than high.

Railroad Merchandise:

Terminal costs on the New Jersey side of North River and at Sixtieth Street.....	\$.15 per ton
Lighterage or equivalent charges.....	.80 " "
Terminal cost on waterfront, Manhattan Island.....	.50 " "
Cost to railroads.....	\$1.45 per ton
Cartage defrayed by shippers.....	.80 " "
Total cost from outlying yards to shippers.....	\$2.25 " "

Coal:

Handling, storage and lighterage or ferriage.....	\$.40 per ton
Cartage	.60 " "
Total	\$1.00 per ton

Steamship Merchandise:

Cartage	\$.80 per ton
---------------	----------------

Based on these figures the approximate annual terminal charges at Manhattan Island for the tonnages handled by the principal carriers, exclusive of the large traffic of the minor carriers, are:

9,800,000 tons at \$2.25.....	\$22,050,000 per annum.
9,400,000 " " .80.....	7,520,000 " "
4,000,000 " " 1.00.....	4,000,000 " "
23,200,000 tons	\$33,570,000 per annum.

In addition to the tonnage passing between the carriers and the shippers, there is a large volume of business that is redistributed from manufactories and warehouses to consumers. Owing to the time required to obtain reliable information on this feature, no attempt has been made to include it in this report; but in seeking for a solution of the freight problem the necessity for more economical and expeditious methods of sub-distribution should not be forgotten.

One of the handicaps of the commerce of the Port is the delay in deliveries, due to the time taken for the lighterage of freight to and from the Island, and the interruptions from fogs and snow storms. Under favorable conditions the minimum time required for the transfer of freight from the New Jersey side of the North River to the consignee on the Island is from three to six hours. An improved method of freight distribution should seek to reduce this time.

The growing importance of the Port, as testified to before the New York Commerce Commission of 1900, is causing congestion of traffic in the Harbor to such a degree that

the time is not far distant when this will become a serious disadvantage, and, therefore, should have consideration in determining what shall be done to improve the situation.

The inaccessibility of the waterfront to the general public has a retarding effect upon its growth, more particularly along the East River where rapid transit facilities are so far removed as to discourage the selection of that side of the Island for passenger boat traffic. From the standpoint of commerce, improved passenger transportation methods should be considered in conjunction with a study of the freight problem.

To summarize, the commerce of the Port of New York requires a solution of the freight problem that will abolish change of bulk on the waterfront, and thus afford space for the expansion of steamship traffic; expedite deliveries; facilitate interchange of freight; reduce harbor congestion; improve accessibility of the waterfront to the public; and decrease costs of freight distribution and sub-distribution.

V.—Requirements of the Public.

From the standpoint of the general public, a solution of the freight problem should result in the removal of vehicular traffic from the surface of the city streets, particularly in lower Manhattan Island where the arteries of travel, originally laid out for four-story buildings, are now gorged with the ebb and flow from twenty, thirty and forty-story buildings. Relief of sidewalks and pavements from the distribution of freight,* in addition to increasing their capacity for pedestrians, would greatly facilitate the movement of street cars, decrease noise, and expedite deliveries.

The municipality will welcome any solution that promises a reduction in the cost of repairs and cleaning of streets. Each year 2,000,000 cartloads of rubbish, ashes and street cleanings are taken from Manhattan, chiefly by scow, at a cost of \$2,000,000. Not only is this expense objectionable, but there is the necessary use of docks for the disposal of the waste materials, that could be used to advantage in the commerce of the Port. The city would also be benefited by reduced cost of pavement repairs if vehicular traffic can be largely dispensed with for the distribution of freight.

The time and cost of handling mails between the downtown general office and the Grand Central and Pennsylvania R. R. stations, have a bearing on the welfare of the public. It is estimated that 100,000 tons of mail matter will require trucking between those points, at a cost of \$230,000 per annum. In addition to the question of cost there is the thirty to forty minutes in time required in each direction by the present wagon method.

Comments similar to those made for the mail situation are applicable to the handling of express.

The disposal of excavation for new buildings is an important item and the public will be well served by any plan for handling freight that at the same time will permit the disposal of this material without clogging streets and without the necessity for the use of docks.

The public is vitally interested in the accessibility of the freight and passenger terminal facilities on the waterfront to the residential and business sections of Greater New York, to the Grand Central and the Pennsylvania R. R. stations, and to the commuting district on the north.

The elimination of tracks at grade on city streets, the betterment of the park dis-

*Exhibits 1, 2 and 3.

tricts and the abolition of the use of steam locomotives are, of course, also to be borne in mind.

To summarize, in solving the freight problem the interests of the public will be best served by a method that will eliminate grade crossings, abolish the use of steam locomotives, remove vehicular traffic from the congested portions of Manhattan Island, expedite and cheapen costs of distribution of freight, mail, express and waste products, and improve the means of passenger transportation between the waterfront and the remaining sections of the city and outlying districts.

VI.—Requirements of the Carriers.

From the standpoint of the railroads the solution of the freight problem should be such as to reduce the costs of distribution, expedite deliveries and afford opportunities for expansion of traffic at valuable terminals on both sides of the North River. Any plan that involves a large expenditure of capital, with no resultant economies to offset the increased interest charges and taxes, will naturally be unwelcome to the transportation interests. Therefore, whatever may be proposed should offer to the carriers the same attractions in lessened cost of operation that are offered to the commerce of the Port in the way of reduced costs of distribution.

VII.—Proposed Solution of the Problem.

The necessity for an immediate solution of the West Side problem has led to the consideration of three different methods:

- (1) Complete removal of the tracks of the N. Y. C. & H. R. R. R. south of Spuyten Duyvil, this being the alternative method specified in the Saxe Law; or
- (2) The depression of the tracks of the N. Y. C. & H. R. R. R. into a subway wherever streets and public places are affected between Spuyten Duyvil and St. Johns Park, as required by the Saxe Law; or
- (3) Tracks to remain on the surface from Spuyten Duyvil to 60th Street, except where it is proposed that they shall be elevated at Manhattanville so that the streets may pass beneath; a subway from 60th Street to 30th Street; and an elevated railway from 30th Street to St. Johns Park.

The first method is antagonistic to the interests of the public and of the Port, because of the enormous expense that will thereby be imposed upon the city for the value of the property taken and for the indirect damages to the company from the loss of the principal terminal of a railway system of 50,000 miles; and because of the necessity that will be forced upon the railroad of securing additional space for handling its traffic along a waterfront already inadequate for the demands of waterborne commerce.

The second method is physically and financially impracticable.

The third method, which is the one substantially agreed upon between the late Rapid Transit Board and the railroad company, and which failed to receive the sanction of the Legislature, is entirely feasible but has the fatal objections of entailing a great expense on the railroad company, estimated at from thirty to forty million dollars, with no reduction of cost of operation nor promise of increased traffic to offset the added interest charges and taxes. Ultimately this burden, if assumed, equivalent to about 50 cents per ton, will result in a raise of freight rates or financial embarrassment to the company.

Moreover, any treatment of the freight tracks of the New York Central that involves the continued entrance of standard freight cars to lower Manhattan, either by

subway or an elevated structure, will seriously interfere with the use of the streets affected for future passenger rapid transit routes; will prohibit connections with industries and the waterfront because of physical difficulties and excessive costs; will increase rather than decrease the cost of freight delivery; and above all, offers no relief from the present costly, slow and congested vehicular distribution of freight on the surface of the city streets.

It may also be added that the completion of passenger tunnel routes beneath the North River will eventually cause the same deterioration of ferry service that has already followed the opening of the tunnel and bridge crossings of the East River; as a result of which the cost and time of delivery of the constantly increasing wagon traffic between the steamship and railroad terminals in New Jersey, and the consumers on Manhattan Island will be seriously increased.

The question therefore arises, why not adopt a method of freight transportation and distribution that will afford rail access to Manhattan Island by all of the trunk lines so that the trans-shipment of freight may be made at remote points where space is less congested and costly than along the waterfront, using a type of car that will have sufficient capacity to accommodate the largest packages of merchandise and still economize space so as to permit the delivery of cars direct to the water carrier, merchant and manufacturer, free from contact with the surface of the city streets and removed from the expenses, uncertainties and delays of harbor navigation.

To meet these conditions, a system of cartage subways for standard gauge tracks is suggested, located immediately beneath the sidewalks of Manhattan Island, tapping both sides of the principal business streets below 42nd Street. As illustrated on the attached exhibits,* this system is encircled by a high speed belt line that is connected with railroads terminating on the west side of the North River; with the 60th Street yard of the N. Y. C. & H. R. R. R. on Manhattan Island; and with the railroad terminals in the Bronx. Provision is shown for future extensions to Long Island City and Brooklyn and along the New Jersey waterfront.

The size of the subways will permit the handling of at least 90 per cent. of all the commerce of lower Manhattan Island, with but one change of bulk at points remote from the congested portions of the city; and with a type of electrically propelled car that can be easily handled on steep grades, sharp curves and on elevators in the shipping and commercial districts, and that can be dispatched over the tracks of connecting trunk lines to industries within a considerable distance of New York, free from the delay and expense incident to trans-shipment of freight. The occupation of the space beneath the sidewalks will not interfere with the use of streets for future subways, will cause minimum interference with sewers and other subsurface structures, will relieve pedestrians from the interference of boxes and barrels on the surface, will be immediately adjacent to the portion of the business houses now used for the storage and handling of freight, and will afford unexampled facilities for the collection and disposal of street sweepings, ashes, garbage, excavated materials and snow.”†

The relief of the marginal way from trucking will make that wide thoroughfare available for an æsthetically designed elevated passenger railway and for automobile and light vehicular traffic between the business and residential sections of the Island. ‡

The roughly approximate estimates of cost range from \$80,000,000. to \$100,000,000.

*Exhibits 4 and 5.

†Exhibit 8.

‡Exhibit 9.

Taking into account all fixed charges and costs of operation, this scheme will permit the distribution of freight, mail and express and the waste products of the city at much less than present costs, so that after paying a fair return on the investment there should be net savings and profits to shippers, carriers, investors and the public of a sum in excess of \$15,000,000. per annum.

In addition to the pecuniary returns, this scheme holds forth the following advantages:

- (a) Solves the West Side problem, securing to the city the benefits of an elimination of tracks at grade in city streets, the abolition of steam locomotives and the betterment of the park districts;
- (b) Releases the New York Central from the necessity of an unprofitable large capital expenditure, estimated at \$40,000,000;
- (c) Renders feasible rail connections to industries and the waterfront;
- (d) Avoids interferences with the use of the marginal ways for passenger railways;
- (e) Relieves the city streets from vehicular traffic, thus reducing noise, cost of pavement repairs, congestion of sidewalks and pavements, delays to street cars and cost of street cleaning and disposal of waste products;
- (f) Relieves congestion and the uncertainties of harbor navigation;
- (g) Makes practicable the access to Manhattan Island of all railroads by rail connection direct to shippers; and
- (h) Releases docks and piers from railroad uses, thus permitting their occupation for the expansion of water-carrier traffic and thereby facilitating the commerce of the Port.

Objections will be urged against this suggested solution of New York's freight problem that it involves revocation of temporary vault privileges; that future passenger subway stations, where affected, will have to be placed deeper than otherwise would be necessary; that a somewhat similar scheme at Chicago has not yet proved successful; and that the plan is a radical departure from existing methods and involves a co-operation of many interests in the States of New York and New Jersey.

To such criticisms the reply may be made that the advantages to abutting owners from access to a freight system of the character proposed will far outweigh the loss to those whose vault privileges are abridged; that the future subway stations, where affected, will have to be no lower than such important existing stations at the Grand Central Station, Brooklyn Bridge, 14th Street and 96th Street, where mezzanine floors are required; that the handicaps of the Chicago freight subways, will all be avoided; and that the advantages to the commerce of the Port, to the railroads, the water carriers and the public are great enough to warrant the surmounting of the difficulties that always attend a departure from faulty methods of long standing.

VIII.—Conclusions.

An analysis of the freight problem of Manhattan Island appears to justify the conclusion that the present status is advantageous neither to the public nor the carriers; that previous studies and reports over a period of forty years favor an elevated railroad on the waterfront for passenger but not for freight purposes; that the leading commercial interests of the community are seeking a solution that will retain to the city its supremacy as the leading port of the country; that the general public will be most benefited by a method that will relieve the streets of vehicular traffic; that the

water and rail carriers will support a treatment of the subject that will expedite and cheapen the distribution of freight; and that the proper solution appears to lie in the adoption of an electrically operated cartage subway system beneath the sidewalks of the business districts of Manhattan, connected by high speed routes with the principal rail and water carriers of the Port.

With suitable arrangements for harmonizing the various interests in New York and New Jersey, the suggested solution is believed to have sufficient merit to invite the investment of private capital under terms alike attractive to the investor and the municipality.

165 Broadway,

New York, September 16, 1908.

EXHIBITS



WORTH STREET.



MERCER STREET.

VIEWS SHOWING PRESENT STREET CONDITIONS.



CHURCH STREET.



CANAL STREET.

VIEWS SHOWING PRESENT STREET CONDITIONS.



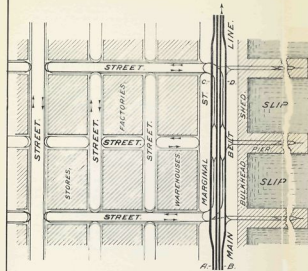
LEONARD STREET.



CHURCH STREET.

VIEWS SHOWING PRESENT STREET CONDITIONS.



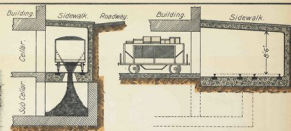


TYPICAL PLAN.

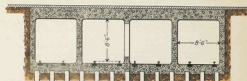


PROFILE.

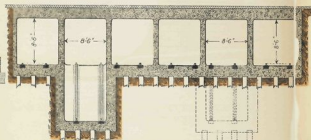
TYPICAL CONNECTIONS
TO AND FROM MAIN BELT LINE.



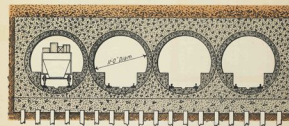
SINGLE TRACK. DOUBLE TRACK.
CROSS SECTIONS AT BUILDINGS.



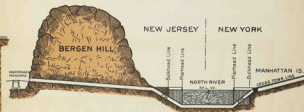
CROSS SECTION BENEATH MARGINAL ST
SECTION A-B.



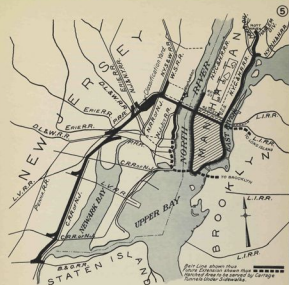
CROSS SECTION BENEATH MARGINAL ST.
SECTION C-D.



SUBAQUEOUS SECTION — NORTH RIVER



PROFILE BETWEEN NEW YORK & NEW JERSEY
UNDER THE NORTH RIVER.



MAP SHOWING PROPOSED BELT LINE.

SUGGESTED CARTAGE BELT LINE
FOR
FREIGHT TRAFFIC

*ROUGH APPROXIMATE ESTIMATES OF COSTS OF VARIOUS SUBWAY AND
ELEVATED RAILWAY SCHEMES INCLUDING TERMINALS.*

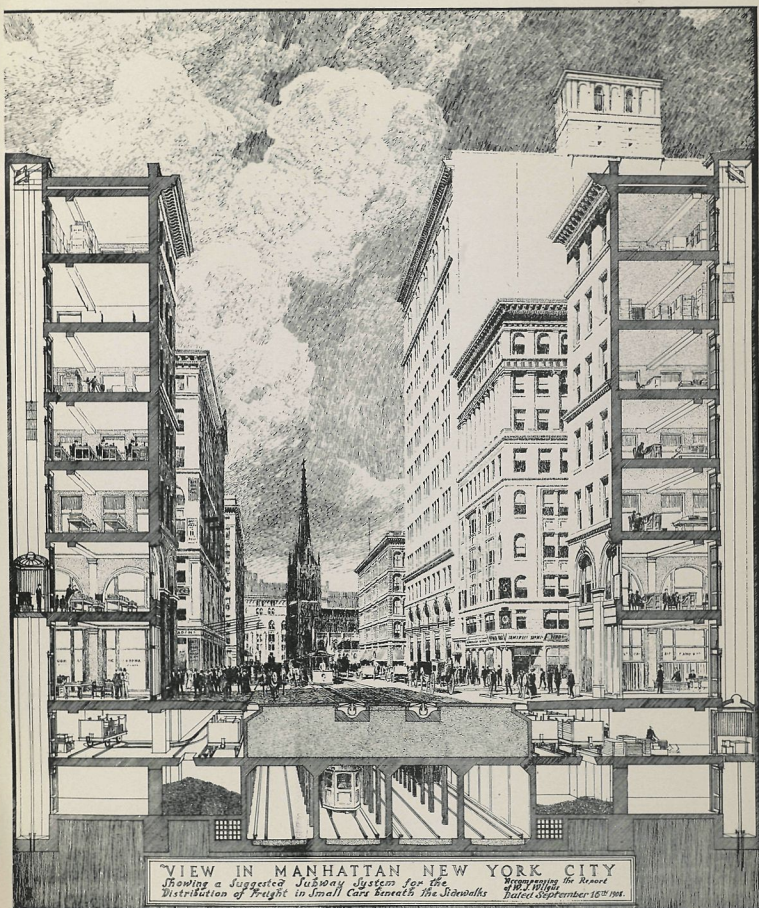
N ^o of Scheme	Description of Schemes				Estimated Cost In- cluding Terminals
	N.Y.C. & H.R.R.R. West Side Schemes.				
	Spuytion Duyvil to 59 th Street	59 th Street to 30 th Street.	30 th Street to Vicinity of St. John's Park	Vicinity of St. John's Park to Battery	
1	Provision for 6 Tracks and increased Terminals	—	—	—	\$13,000,000
2	"	2 Track Subway	2 Track Subway	—	\$34,000,000
3	"	4 " "	—	—	\$19,000,000
4	"	4 " "	2 Track Subway	—	\$32,500,000
*5	"	6 " "	—	—	\$21,500,000
6	"	6 " "	2 Track Elevated	—	\$29,000,000
7	"	6 " "	4 " "	—	\$31,000,000
8	"	6 " "	4 " "	2 Track Elevated	\$32,500,000
9	"	2 Track Elevated	—	—	\$15,500,000
10	"	2 " "	2 Track Elevated	—	\$23,000,000
11	"	2 " "	2 " "	2 Track Elevated	\$24,500,000
12	"	4 " "	—	—	\$17,000,000
13	"	4 " "	4 Track Elevated	—	\$26,500,000
14	"	4 " "	4 " "	2 Track Elevated	\$28,000,000
15	"	4 " "	4 " "	4 " "	\$29,500,000
16	"	6 " "	—	—	\$18,500,000
17	"	6 " "	2 Track Elevated	—	\$26,000,000
18	"	6 " "	4 " "	—	\$28,000,000
*19	"	6 " "	4 " "	2 Track Elevated	\$29,500,000
20	"	6 " "	4 " "	4 " "	\$31,000,000
*Add for future enlargements to accommodate increased volume of traffic \$19,000,000					
Carriage Belt Line for Freight					
21	4 Track Belt Line on Manhattan Island; 4 Tracks to Railroad Con- nections in New Jersey; 2 Tracks to Connections with Railroads in the Bronx and 40 Miles of Street Distribution				\$80,000,000 to \$100,000,000
Terminal Belt Line for Passengers.					
22	2 Track Subway Blackwells Island Bridge to 12 th Ave; 2 Track Elevated on Marginal Way 60 th St to 30 th St; 4 Track Elevated on Marginal Way 30 th St to the Battery; 2 Track Elevated along East River from the Battery to 42 nd St; 2 Track Subway East River to North River via G.C. Sta. and P.R.R. Sta. also 2 Track Subway along the East Side of Manhattan Island to Blackwells Island Bridge.				\$25,000,000 to \$35,000,000 exclusive of equipment
23	Same as (22) with 4 instead of 2 Tracks in the Marginal Way 60 th St. to 30 th St.				\$27,000,000 \$37,000,000 exclusive of equipment.
24	N.Y.C. & H.R.R.R. Crosstown Subway, 2 Tracks				\$ 5,500,000
25	N.Y.C. & H.R.R.R. " " 4				\$ 8,500,000

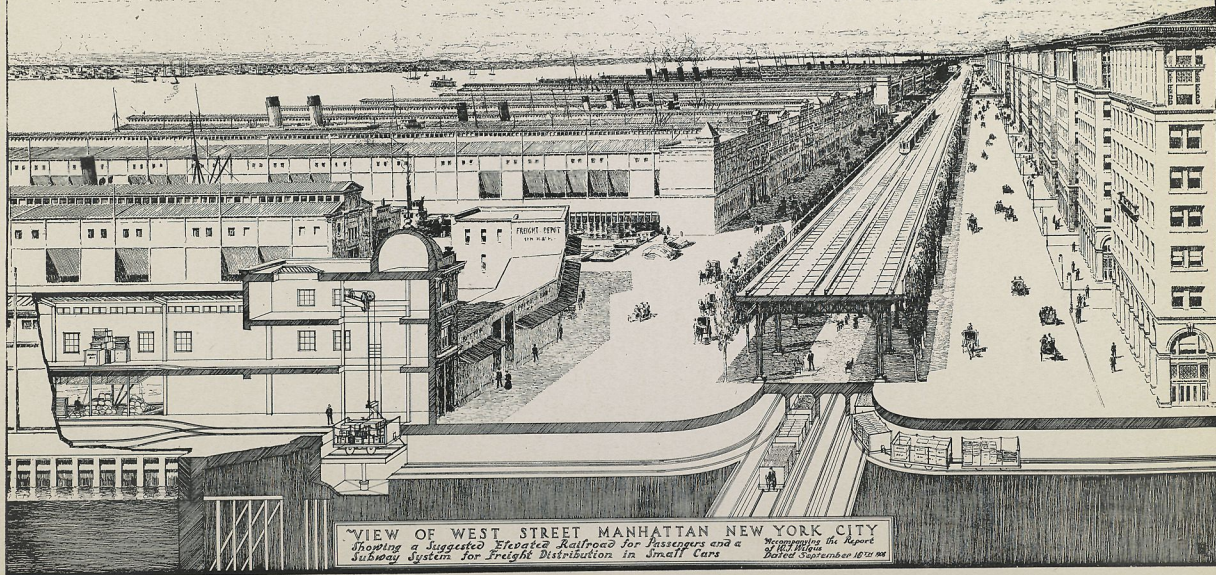
**SUMMARY OF TONNAGE STATISTICS
OF THE
PRINCIPAL RAIL AND WATER CARRIERS SERVING MANHATTAN ISLAND.**

Item.	Carrier	Inbound-Tons			Outbound-Tons			Total-Tons			Remarks.	
		Requiring drayage.	Lightered & not requiring drayage.	Totals	Requiring drayage.	Lightered & not requiring drayage.	Totals	Requiring drayage.	Lightered & not requiring drayage.	Totals		
1	Railroads	Merchandise	6,728,239	2,136,099	8,864,338	3,039,705	1,213,549	4,253,254	9,767,944	3,349,648	13,117,592	Coal delivered to Power Sta's. on water front not included.
		Coal	3,953,840	0	3,953,840	0	0	0	3,953,840	0	3,953,840	
		Total	10,682,079	2,136,099	12,818,178	3,039,705	1,213,549	4,253,254	13,721,784	3,349,648	17,071,432	
2	Trans-Atlantic Lines.	559,500	997,500	1,557,000	805,500	1,583,500	2,389,000	1,365,000	2,581,000	3,946,000	Lines terminating in Brooklyn & New Jersey not included.	
3	Coastwise Lines.	1,437,000	1,989,000	3,426,000	1,476,000	1,859,000	3,335,000	2,913,000	3,848,000	6,761,000	Incomplete.	
4	Sound Lines.	774,101	266,283	1,040,384	604,456	588,376	1,192,832	1,378,557	854,659	2,233,216	Incomplete	
5	River Lines.		Collection of			Data still		in Progress.				
6	Irregular Lines, including Tramps, Barges, Sailing vessels	3,000,000	0	3,000,000	0	0	0	3,000,000	0	3,000,000	Incomplete.	
7	Totals. (Omitting item 5.)	16,452,680	5,388,882	21,841,562	5,925,661	5,244,425	11,170,086	22,378,341	10,633,307	33,011,648	Incomplete.	

NOTE:

Total tonnages (Item #7) include considerable duplication. A large portion of the tonnage lightered to and from water carriers is included in the railroad tonnage. About 20% (say 1,000,000 tons annually) of the water carrier tonnage that is drayed, also appears in the railroad tonnage. For the purposes of this report it may be assumed that the River traffic and the business of the "Irregular lines" will more than offset the duplications in the totals.





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- "City Improvements, Rapid Railway Conveyance in the City of New York," p. 67; by O. Vandenberg. N. Y., 1866. John Wiley & Son. (Suggests a marginal elevated railroad; one-half page.) (Bb-53.)
- "Elevated Margin Steam Railroad, Transportation for Passengers, Relief for New York." N. Y., 1867. (Bb-14.)
- "Relief of Broadway; Plans for the Accommodation of Passengers and Freight from the Upper to the Lower Portion of the City," p. 12. N. Y., 1867. Wm. C. Bryant, 41 Nassau St. (Gives plan for a waterfront railroad.) (Bb-23.)
- "Routes and Constructions for Rapid Transit in the City of New York as Designed by W. E. Worthen." (Gives route for a river-front line.) (Bb-22.)
- "Rapid Transit and Terminal Freight Facilities;" by O. Chanute, M. N. Forney, Ashbel Welch, Charles K. Graham and Francis Collingwood. Transactions American Society of Civil Engineers, v. 4, pp. 43, 46. (Paper 106, 1874.) (A proposal for a belt railroad on West Street.)
- "Plans for Elevated R. R. in New York," by C. W. Hunt, N. Y., 1874. (Manuscript.) (Suggests a route following West Street from Gansevoort St. to the Battery.) (Bb-41.)
- Report of the Committee on Terminal Facilities of the New York Cheap Transportation Association presented at the Annual Meeting held Jan. 29, 1874, pp. 8, 35. N. Y., 1874. George F. Nesbitt & Co., Pearl and Pine Streets. (Pamphlet.) (Sa3-205.3.)
- "Annual Meeting of the New York Cheap Transportation Association Jan. 18, 1876; Minutes, p. 12." N. Y., 1876. Lawrence & Allen, 20 Vesey St. (Short reference to a freight railway on West St.) (Pamphlet.) (Sa3-205.1.)
- "Annual Meeting of the New York Cheap Transportation Association Jan. 9, 1877; Minutes." pp. 16, 18. N. Y., 1877. L. W. Lawrence, 49 John Street. (Contains a report of Committee on terminal facilities, relative to the Belt Railroad.) (Pamphlet, Sa3-205.1.)
- "The Rapid Transit Problem in New York;" by W. Howard White. *Railroad Gazette*, v. 23, p. 279 (April 24, 1891). (Proposes a plan for a road to connect with the New York Central tracks on the western side of the City.)
- "Suggestions for Rapid Transit in New York." *Railroad Gazette*, v. 27, p. 21. (Jan. 11, 1895.) (A suggestion by J. J. Croes for a route passing Liberty St. and Christopher St. ferries.)
- "Rapid Transit in New York." (Editorial) *Railroad Gazette*, v. 27, p. 22. (Jan. 11, 1895.) (Discusses Mr. Croes suggestion.)
- "Department of Docks; Reports of Board of Consulting Engineers, Nov. 11, 1895 to Dec. 15, 1897," p. 25. N. Y., 1897. Commr. of Docks, Pier A. (A plan for a marginal railroad on West St., to facilitate the handling of freight.)

Series of articles in the *Journal of Commerce and Commercial Bulletin*, February 23-March 22, 1898.

"Improvement of the Terminal Facilities at the Port of New York." *Engineering News*, v. 39, p. 154 (March 10, 1898). (A review of a criticism by C. W. Buchholz, M. Am. Soc. C. E., on a report on a railroad in West St.)

"Water Front Railroads for New York" (Editorial) *Railroad Gazette*, v. 29, p. 347 (May 21, 1897.) (One-half column.)

"The Railroad on West Street, New York." *Railroad Gazette*, v. 30, p. 160 (March 4, 1898). (Abstracts of Mr. Buchholz's criticism.)

"The Immediate Betterment of Manhattan Transit;" by O. F. Nichols. (Letter) *Railroad Gazette*, v. 30, p. 471 (July 1, 1898.) (A plan of extension of the elevated railroad is proposed by which the lines are carried along the waterfront for the lower section of the island in order to give access to the ferries and other lines of water transportation.)

"Report of the New York Commerce Commission transmitted to the Legislature, January 25, 1900." Vol. 1, pp. 464, 472, 473, 620, 670. Albany, 1900. (Suggestions for an elevated freight railroad along the waterfront on West Street.) Zd-101, v. 1.)

"Application for the Right to Build Overhead Trolley in New York." *Street Railway Journal*, v. 22, p. 1003 (Dec. 5, 1903). (One-half column, giving abstract of circular sent out to property owners along West Street in regard to converting the West Street horse-car line into an overhead trolley system.)

"Reform and Street Railway Extensions" (Editorial) *Street Railway Journal*, v. 22, p. 963 (Dec. 5, 1903). (On the proposed improvement in West Street; one page.)

"Proposed Mixed System for New York." *Street Railway Journal*, v. 22, p. 1040 (Dec. 12, 1903). (A modified mixed system of storage battery and direct supply system recommended for the proposed electric line on West Street; one-half column.)

"Report of the Board of Rapid Transit Railroad Commissioners, for and in the City of New York for 1903, p. 213, N. Y., 1904. 320 Broadway. (Contains a recommendation of William Barclay Parsons for an elevated structure south of Fifty-ninth Street as far as Beach Street, either on West Street or Eleventh Avenue, by the N. Y. C. R. R., and its conversion into a passenger line.) (Bh-19.)

Abstract of same. "Report of the Royal Commission on London Traffic," vol. 4, p. 193. London, 1906. Wyman & Sons, Ltd., 109 Fetter Lane, E. C., 42 shillings. (Bj-12.)

"The Transportation Problem of Greater New York;" by W. W. Wheatly. Proceedings, New York Railroad Club, v. 13, p. 245 (June, 1903). (Contains one paragraph, giving Mr. Parsons' plan for a railroad on West Street.)

"Report on the Rapid Transit of New York City." Mun. Art. Soc. of N. Y. *Bulletin*, No. 14, pp. 26, 37 (1904). (Short reference to elevated or subway tracks on West St.) (Sa3-216.1.)

- "Report of Thoroughfares Committee of Municipal Art Society. *Bulletin*, No. 5, p. 18. Municipal Art Society of New York, 1904. Calvin Tompkins, 37 W. 34th St. (Contains half a page on the utilization of West St. for an elevated system.) (Sa3-216.1.)
- "Report on Passenger Transportation System of New York City Plan Committee of the Municipal Art Society." *Bulletin*, No. 3, p. 7. (Discussion of Rapid Transit Commission Plans, refers to an elevated railroad on West St.) (Sa3-216.1.)
- "Report of the Department of Street Cleaning, 1906."
- "Horse Cars on New York City Streets." (Editorial Note) *Engineering News*, v. 57, p. 115 (Jan. 24, 1907). (Very Short; the statement is made that all horse cars will be eliminated, except the belt line on West Street, where occasional high tides present the use of electric conduits.)
- "West Side Tracks, City of New York," 1907. (Pamphlet issued by N. Y. C. & H. R. R. R.) Contains various letters and reports bearing on the treatment of the N. Y. C. & H. R. R. R. tracks from Spuyten Duyvil to the lower end of Manhattan Island.
- "Report of the Public Service Commission of the First District," 1907. Pages 15 *et seq.* and 53 *et seq.* treat the West Side problem.
- "Journal of the Merchants and Manufacturers Board of Trade." Sept., 1907. Special article on New York's congested commerce by the Hon. Alex. R. Smith, former member of the New York Commerce Commission.
- "Report of the Chamber of Commerce," 1906-1907.
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- "Report of Committee on Foreign Commerce and Revenue Laws of the Chamber of Commerce," adopted by the Chamber January 2, 1908.

DEPARTMENT OF DOCKS

REPORTS

OF

BOARD OF CONSULTING ENGINEERS

NOV. 11, 1895

TO

DEC. 15, 1897

DEPARTMENT OF DOCKS.

OFFICE OF THE BOARD OF CONSULTING ENGINEERS.

NEW YORK, December 15th, 1897.

TO THE BOARD OF DOCKS:

Gentlemen.—The Board of Consulting Engineers, appointed in pursuance of your resolution of November 11th, 1895, has, from time to time, submitted partial reports, seven in number. It appears to the Board expedient, at this time, when Greater New York is about to come into existence, to present another report in the form of a summary of the preceding ones in order to call attention to their salient points in a single paper and to emphasize them.

The resolutions of November 11th, 1895, were in the following words:

“Resolved, That the Board of Consulting Engineers be and is hereby requested to review the improvements of the water-front and the plans therefor; and further

“Resolved, That the said Board be and hereby is requested to submit, with their report, such suggestions as they may deem proper for the betterment of such plans, with the view of securing a larger usefulness of the water-front of the city of New York.”

The Board had its first meeting December 12th, 1895, and was organized by appointing General Thomas Lincoln Casey as Chairman, the other members being Mr. George S. Morison and Professor William H. Burr.

The first report of the Board was dated February 6th, 1896, and while reviewing the general arrangement of docks in the city of New York, related particularly to the North river front as the only one which is adapted to the accommodation of vessels of the largest class.

“Foreign commerce is now dependent on steamship service. The city of New York has been built up and lives on foreign commerce; as the prosperity of the city depends on this foreign commerce more than on anything else, the development of this commerce should be given preference over anything else; this means that the provision of the best possible facilities for ocean steamers must be the leading idea in considering the best plans for the New York dock system.”

For this reason, the first report of the Board had reference, especially, to that portion of the North river which is now available for the service of steamships of the largest class; that is, from the Battery to West Fifty-ninth street.

“The general arrangement, which dates back to the plan of 1871, provides for a bulkhead wall about one hundred and eighty feet west of the old crib bulkhead (the latter having been very irregular in shape), so situated as to give a marginal street (including the old street) two hundred and fifty feet wide. This bulkhead wall is a permanent masonry construction. Outside of this bulkhead wall are projecting piers of varying lengths, reaching from the bulkhead line to the pierhead line. Between West Eleventh and West Fourteenth streets the bulkhead line of 1871 was so near the pierhead line as to virtually eliminate the piers.”

As the physical characteristics of the North River must regulate the class of construction which can be placed there, a description of them was given, special reference

being made to the difficulties due to the depth and character of the mud which is found so extensively. On this subject the Board remarked as follows:

“As the bulkhead wall is a retaining wall, which has to resist the horizontal thrust of the earth filling behind it, and both that earth filling and the wall itself are floated in mud, the problem of providing a permanent construction becomes a very unusual one. To build a retaining wall on solid foundation is a simple problem. To build a wall to carry vertical weight only, on a soft foundation, is more difficult. To float a wall in mud, when that wall must also take a horizontal thrust, is a problem which can only be solved by care and experience, no formulae or mathematical rules being available. The wall, as now built, is a satisfactory solution of this problem. Your Board believes it to be a unique construction, one which is worthy of the most careful study, and deserves the strongest commendation.

* * * * *

“The length, measured on the bulkhead line, from the Battery to Gansevoort street, is 13,439 feet—a little more than two and one-half miles. Of this, 8,089 feet—about one and one-half miles—belongs to the city; 3,433 feet belongs to various private owners, and 1,917 feet to railroads. The city owns about sixty per cent. of the whole.

“The present use of the 13,439 feet is as follows:

Foreign steamship lines	1,779 feet	
Coasting steamship lines	1,861 “	
		3,640 feet
Railroads	3,883 “	
Ferries	1,116 “	
Miscellaneous, including inland steamboat lines.....	4,800 “	
		13,439 “

“In other words, of the two-and-a-half miles of water-front which are better adapted than any other to the use of the class of commerce on which the prosperity of New York is most dependent, only 13.24 per cent. is now occupied by foreign steamship lines, and only 27.08 per cent. is occupied by all classes of ocean steamships, while 28.29 per cent. is occupied by railroads.”

After adverting to the present method of using the North River front the Board expresses the opinion that “the entire passenger service, both of ferries and steamship lines, should be handled on the second story, and that the passengers should be taken across the marginal street on bridges, leaving the street itself entirely free for freight traffic.”

“The plans of the Department provide for a marginal street two hundred and fifty feet wide between the Battery and Charles street. From Charles street to Gansevoort street, where the improvement is not yet begun, this width is reduced to one hundred and fifty feet, so as to provide longer piers. The original width of West street was generally seventy feet, the additional one hundred and eighty feet being added when the present bulkhead line was established. While this broad marginal street has been looked upon as an ornament to the city, it must be remembered that the water-front of the city is for use rather than for ornament, and the functions of the Department of Docks is to provide facilities which will increase the commerce of the city and not to ornament it. The proper use of the marginal street is entirely a commercial one. After reserving so much of the eastern part of the marginal street as is necessary for ordinary street purposes, the remainder should be treated in that way which will best facilitate the handling of ocean-

borne freight. In other words, the greater part of the street should be used in connection with the piers. To accomplish this result in the best manner, the suggestion already made of transferring all passenger service to overhead bridges is the first requirement. With the passenger service removed from the surface, the street may be divided into longitudinal sections, each devoted to a different use.

"The practice already prevails of allowing the fifty feet immediately back of the bulkhead line to be occupied by sheds used in connection with the service on the piers. Your Board believes that this practice should be allowed everywhere below Charles street, thus reducing the apparent width of the marginal street to two hundred feet, a width which can readily be crossed by single-span bridges for passenger traffic. The tenants of the piers and bulkheads should be allowed to use the next eighty feet for the storage of such heavy commodities as can safely be stored in the open air, these generally being of a class which would not be left very long in this position; this will leave a space of one hundred and twenty feet between the storage limit and the east line of the street.

"In the reach between Charles and Gansevoort streets, where the marginal street is but one hundred and fifty feet wide, until the east line of this street can be moved back, no sheds should be allowed on the bulkhead, and storage should be limited to the thirty feet adjoining the bulkhead wall."

The importance of providing the best facilities for docking and cleaning the largest ships was pointed out.

"There are a number of floating docks on the East River, but the only fixed graving docks available for general commercial use are the two Simpson timber docks at the Erie Basin in Brooklyn, which are remote from the steamship piers, and neither of which is large enough to take in a modern Atlantic liner. There are two graving docks in the Brooklyn Navy Yard—one of stone and one of timber—while a third, now under construction, when completed, will be just large enough to take in the steamship 'Lucania,' but more than one hundred feet shorter than the new Southampton dock. Furthermore, these navy yard docks are built primarily for the use of the Navy; they are inconveniently situated for merchant vessels, and merchant vessels must always wait for naval vessels. The steamers of the American line, when they are laid off for their annual overhauling, have now to be taken from their pier on the North River, about three hundred miles, to Newport News, where they are docked and are then either brought back to New York or taken to Cramps' yard in Philadelphia for such other work as may be needed. At Southampton the same ships are docked within a steamer's length of the loading berth.

"It appears to this Board that the provision of suitable graving docks is a proper function of the Department of Docks, and that facilities similar to those furnished in Liverpool and Southampton should be furnished in the port of New York. Furthermore, these docks should not be private enterprises, but a part of the New York dock system, under the control of the Department of Docks; the charges being made with reference to the encouragement of the commerce of the port rather than to the profit of their owners.

"To accommodate the shipping which will be berthed on the North river, the graving docks should be located on the North river, where a steamer could be taken from her berth to the dock on a single tide, with the least possible expense and delay, and brought back to her berth in the same manner.

"While it is possible to build graving docks on soft material, and many of the English docks have been built in this way, there is a very great ad-

vantage in economy, of both construction and maintenance, in having a rock foundation. Fortunately, a good site for this purpose is found on the North river, between Forty-ninth and Fifty-third streets, where graving docks could be excavated entirely from solid rock, and where the rock on the bulkhead line is nowhere more than forty feet below mean high water. Of course, the docks must be put entirely back of the bulkhead line, and it might be expedient to put the gates on the shore-line of the marginal street. The length of the blocks from the marginal street to Eleventh avenue is about eight hundred feet, offering room for a dock of the same dimensions as the largest Southampton dock; and this length could ultimately be increased to cover a thousand feet by placing an additional abutment on the bulkhead line, against which a caisson gate could close. Apparently, the two blocks between Fiftieth and Fifty-second streets are best adapted for this purpose, and three docks could be built on these two blocks. It would seem expedient to acquire at least three (possibly four) blocks, with a view to ultimately increasing the number of docks to five or seven. Of course, not all of these docks would be of the maximum size.

"While this may seem a radical departure in the practice of the Department of Docks, this Board believes it to be a most important matter, and commends it to your careful consideration."

The first report concludes with the following statement:

"This Board recognizes that while the suggestions made do not involve any changes in the methods of construction now in use, they mean some radical changes in the use and development of the North river front, especially as regards the accommodations given to railroads. While the Board feels positive that this is the course which should be pursued and that all work which can be done on land should be taken from the water, it must not be understood that these changes would be made at once or be of a sudden character; they could only be carried out as leases expire, as property now owned by private individuals and railroads is acquired by the city, and as steamship lines demand and need property now occupied in other ways. It would be a gradual and not an immediate change."

General Casey having died, March 25th, 1896, and General William P. Craighill having been appointed his successor, at the first meeting of the Board thereafter, on motion of General Craighill, Mr. Morison was chosen Chairman.

The second report related to the East river front, being dated October 6th, 1896.

"For convenience of description the East river may be divided into four sections; the first, extending from the Battery to Grand street, the second from Grand street to Fourteenth street, the third from Fourteenth street to Thirty-fourth street, and the fourth from Thirty-fourth to One hundredth street, One hundredth street being recognized in the Dock Department as the division between the East river and the Harlem river. Those four sections will be considered separately."

A description was given of the present condition and uses of the several sections of the East river water front, with general suggestions as to its rearrangement and the transfer to the East river of certain classes of business from the North river front, in order to make the latter free for the improvements of which it is capable, and its adaptation for use by the largest vessels engaged in foreign trade.

On the 22d day of April, 1897, this Board appeared before the New York Harbor Line Board and urged a modification of the pierhead line on the North river, which would permit the construction of longer piers, your Board specially requesting that

a change be made on the portion of the river opposite the Gansevoort street improvement. The request of this Board was recommended by the Harbor Line Board and approved by the Secretary of War, with the result that the new steamship piers now being built average thirty-one feet longer than was previously intended, while the bulkhead wall has been retained in a line with the bulkhead wall below, two hundred and fifty feet west of the easterly line of West street, instead of being moved one hundred feet eastwardly, as had been proposed, work having actually been begun on the wall on the line of the narrower Way.

The third report was dated April 30th, 1897, and related to the use of the Marginal Way:

"Appreciating the very great importance of railroad connections with the water front in New York City, your Board has carefully studied the entire water-front on both rivers, going over a considerable portion of the line on foot, and also visiting that part of the Brooklyn water-front where railroad tracks have been laid in connection with float landings, so that any railroad having a terminus about the harbor of New York can place its cars alongside steamers or at the doors of warehouses.

"The water-front of New York City, both on the North river and on the East river, suffers seriously from a lack of proper facilities for the interchange of freight between the railroads which reach the shores of the harbor and the shipping which enters the port. It has seemed to your Board that the present condition of commerce in the port of New York calls for material improvement in existing facilities for the exchange of freight between land and water transportation. Goods brought to the piers, whether they come by railroad or from within the city, are subject to inconvenient and expensive methods of handling. In but few instances can railroad cars be run upon the piers on the New York water front. Better methods of handling large quantities of freight are found in rival ports, and their existence is demanded in New York City. It has been the purpose of your Board to recommend such a disposition of the facilities offered by the Marginal Way as will give permanent relief from these difficulties, difficulties which have received much attention from the larger commercial bodies of the city during the past two years.

"The principal end is to facilitate the interchange of traffic between land and water lines of transportation, and at the same time improve the means of reaching either class of transportation from the city. This means an arrangement by which railroads can place their cars alongside ships as they lie at the piers, and also run their cars directly to conveniently located storage warehouses. At the same time it is essential that the land approaches by which teams reach the piers should be as free as possible, and that this freedom of approach should extend to the railroad tracks as well as to the piers."

For strong reasons stated, the Board concluded that an elevated railroad along the water front could never be as efficient for handling freight as a surface road, and reiterated the opinion that if it be necessary to have an elevated road along the marginal way on the North river, it should be for passengers only.

The manner in which the marginal way should be arranged was indicated as follows:

"A freight railroad along the river front must not be regarded as a through line over which trains would run, but simply as a long, narrow yard used entirely for switching purposes and for standing cars in convenient positions; but it must be remembered that property here is too valuable for

the storage of cars, and they should be left standing no longer than is necessary for loading and unloading. This means that there must be two main tracks kept clear for the quick moving of cars, and additional tracks on which cars can be placed, which latter must be accessible for loading and unloading. The only system which seems to meet these conditions is that of a four-track railroad, the two middle tracks being kept open as main lines, to be operated by switching engines, but on them no cars should be allowed to stand. The two outside tracks would be used to stand cars on, and these car tracks should be so situated that the cars on them can be approached by trucks or teams. Spur tracks should be run from the outside track on the water side to piers whenever desired by lessees, and similar tracks should be run from the outside track on the land side into adjoining property, whenever owners desire to use it in this way. With this system there would be complete railroad communication with every pier on the water front, and the blocks adjacent to the marginal way would be available for freight stations and for warehouses, and cars could be run directly into such stations or warehouses.

"If the four tracks are laid twelve feet between centres, the customary width in this part of the country, the width of the four tracks from rail to rail will be forty-one feet; the width measured to the outside of freight cars standing on them will be forty-five feet; the width between proper clearance lines seven feet from the centre of each outside track will be fifty feet. In the report of February 6th, 1896, the Board located this fifty-foot strip next to a street seventy feet wide; on further thought, it is believed that this strip should be placed nearer to the river, and that sufficient space should be allowed between the first track and the margin of a seventy-foot street, to allow teams to load into cars standing on this track, without encroaching on the seventy-foot street. It might be well to allow a permanent fence to be constructed, which should separate the portion of the marginal way used for street traffic from that use in connection with the railroad and piers; that is, a fence might be built along the present line of West street seventy feet from the building line, with gates at suitable intervals, through which teams could approach the piers. For this reason it seems proper to place the shore edge of the fifty-foot strip ninety feet from the building line of the marginal street; the water edge of this strip would then be one hundred and forty feet from the building line, leaving one hundred and ten feet between it and the bulkhead wall where the street is two hundred and fifty feet wide. As the centre of the outside track is seven feet from the edge of the fifty foot way, and the fifty feet next to the bulkhead wall is now occupied by sheds, the centre of the outside track would be sixty-seven feet from the face of the sheds. This will not permit tracks running onto the piers to make the whole turn outside of the shed line without objectionably sharp curvature, but by extending the curvature through the sheds and a short distance on the piers, curves of two hundred feet radius can generally be used, which are satisfactory for the purpose in view. In Brooklyn, curves of about eighty feet radius are now in use."

The importance of the width of two hundred and fifty feet for the Marginal Way on the North river was again referred to. A width of two hundred feet was deemed sufficient for the Marginal Way on the East river front provided no sheds were allowed along the bulkhead wall, and the division of the width of two hundred feet were made to correspond precisely to the division of the two hundred and fifty feet of the Marginal Way on the North river, the bulkhead wall on the East river taking the place of the shed line on the North river.

The need of float landings at suitable locations was pointed out.

The benefits to all parties affected by the proposed system of surface tracks were dwelt upon. The opinion was expressed that "a system of railroad tracks in the Marginal Way can and should be provided along the North river, between Battery place and Christopher street, and that this should be extended further northward whenever room is available. There should also be a railroad system in the Marginal Way on the East river, extending from the Battery to Corlears Hook; this railroad to have no connection excepting with transfer boats and floats."

The Board then passed to an explanation of its views as to the proper method of handling other traffic than freight, and concluded the report of April 30th, 1897, as follows:

"Your Board has described in this report a system which will make railroad connections between the piers on the water-front and the railroads which reach the harbor, this including railroad communications between the several piers. Your Board is thoroughly impressed with the importance of such an arrangement, and believes that it is the only method by which the port of New York can maintain its position among its rivals. The cost of such a four-track railroad system would be small; simply the expense of laying the tracks, and these tracks, including all switches, should not cost more than eight thousand dollars per mile of single track."

The fourth report, dated June 15, 1897, was prepared in response to a special resolution of the Board of Docks which is as follows:

"Resolved, that the Board of Consulting Engineers be and is hereby requested to prepare plans showing cross sections of the Marginal Way and methods of approach to the piers referred to in their report of April 30th, 1897."

This report is brief and explains the drawings submitted in compliance with the resolution already quoted.

The fifth report, dated July 10th, 1897, was made in response to a request for a consideration of the proper method of arranging the easterly fifty feet of an exterior street one hundred and fifteen feet wide extending from the centre line of East 64th street to the northerly line of East 81st street.

The sixth report, dated October 21st, 1897, related to the East River front and certain modifications of the marginal way thereon, in view of the question that has been raised whether a portion of that way could not be made for warehouses, and the conclusion of the Board is given in the following quotation:

"Although your Board considers it of the utmost importance that the width of the marginal way should not be reduced below the established two hundred feet, and that the portion to be occupied by longitudinal traffic should be maintained one hundred and forty feet wide, with provisions for approaches in the adjoining sixty feet, it does not necessarily follow that this way should be immediately adjacent to the bulkhead wall. On the North River, where the established width of the way is two hundred and fifty feet, your Board has recommended that the fifty feet along the bulkhead wall should everywhere be occupied by sheds; the width of these sheds was fixed at fifty feet because it was considered important to retain the remaining two hundred feet for the purposes specified in the earlier reports. Had the way been three hundred feet wide, there would have been no objection to occupying one hundred feet by sheds, and to expanding the uses of these sheds into something like complete warehouses. It is only the natural development of this idea to say that where there is a special demand for warehouses adjoining the piers, such warehouses may be permitted immediately along the bulkhead

wall, provided the proper width for a marginal street can be reserved back of these warehouses. In other words, the principal object of the marginal way is access to the various interests along the water front. Where these interests are of a nature which generally exists along the North river, namely, regular transportation lines which deliver passengers and goods to be quickly taken away with comparatively little storage, the way should be near the bulkhead. Where the business is principally of a storage character, the stores may be most conveniently located between the piers at which the steamers land, and the way on which the goods are finally taken off.

"Where there is any large amount of business across the river, such as frequent ferries, there are objections to placing the marginal way back from the bulkhead, but if localities can be found in which there are no demands for reaching the river bank, there would be no such objection."

A seventh report, dated December 10th, 1897, was accompanied by a plan showing how this object could be accomplished.

Question having arisen as to the intent of the expressions of this Board in regard to the proposed modifications of the Marginal Way along the East river, your Board desires to state that in describing the plan submitted with the report of December 10th as a *possible* solution of the question, your Board simply meant to say different arrangements of the Way, where it does not follow the bulkhead line, would be permissible. The position of this part of the Way could only be determined after an agreement with the property holders. This Board has no doubt of the expediency of placing the Way back of the bulkhead line on this part of the East river and fully recommends the plan submitted with the report of December 10th.

A file of the seven reports and of the maps and plans which accompanied them is appended hereto.

Respectfully submitted,

GEO. S. MORISON,
WM. H. BURR,
WM. P. CRAIGHILL.

OFFICE OF THE BOARD OF CONSULTING ENGINEERS,
NEW YORK, February 6, 1896.

To the Board of Docks:

GENTLEMEN.—The Board of Consulting Engineers, appointed in pursuance to the resolution of November 11, 1895, respectfully submits the following report, in response to the following resolution of December 12, 1895, to wit:

Resolved, That the Board of Consulting Engineers be and is hereby requested to review the improvements of the water-front, and the plans therefor; and further

Resolved, That the said Board be and hereby is requested to submit, with their report, such suggestions as they may deem proper for the betterment of such plans, with the view of securing a larger usefulness of the water-front of the City of New York.

The subjects covered by these resolutions are of such magnitude and general character that this Board has thought best to review the general arrangement of docks in the City of New York, and to consider more in detail the features which it thinks of paramount importance, leaving other matters to be considered in reply to such further communications as your Honorable body may see fit to make.

The water-front of New York City is naturally divided into three grand divisions: The North river front, the East river front, and the Harlem river. The conditions of these three rivers are so widely different that they can best be treated separately, the different divisions bearing little relation to one another, except as each relieves the other two from the class of traffic which it can accommodate.

Of these the North river is by far the most important, and the only one which is adapted to the accommodation of the largest class of vessels. The East river has always been the headquarters of sailing vessels, and it possesses advantages for the construction of warehouses and in convenience of access to the Sound ports, which may become very important. The Harlem river, with its narrow channel and frequent drawbridge obstructions, is not available for the larger class of craft, though it is very useful for distributing building material, fuel and other supplies which may be wanted locally in the neighboring parts of the city.

The North river, on the other hand, with a width of over three thousand feet between pierhead lines, with abundant depth, a straight course and an unobstructed connection with the lower bay, affords ample room to handle every class of vessel. The current of the North river is less rapid and more regular than that of the East river. The only objection that has been raised to this river is that large ice fields have been known to come down it, which have sometimes been dangerous to piers and the lighter class of craft; these ice fields, however, are not such as to endanger ocean steamers, and give but little trouble to well-constructed piers, and should it ever be found necessary, they can be broken up by ice-boats of the class used in the Detroit river, and all danger from this source removed; of course, ice will at times obstruct the entrance to slips and cause delays, nothing but a change of climate can avoid this difficulty; but it is less on the North river than on any other portion of the New York water-front. In brief, the North river is so much better adapted than any other part of the harbor to modern steamship service that so long as there is space on this river Atlantic steamers will not go elsewhere; if they cannot be accommodated on the New York side they will go to the Jersey side; if they cannot get accommodation on either side they will probably seek other ports.

Foreign commerce is now dependent on steamship service. The City of New York has been built up and lives on foreign commerce; as the prosperity of the city depends on this foreign commerce more than on anything else, the development of this commerce should be given preference over anything else; this means that the provision of the best possible facilities for ocean steamers must be the leading idea in considering the best plans for the New York dock system.

For this reason the Board of Consulting Engineers has thought it best to confine this report to the North river, and especially to that portion of the North river which is now available for steamship service, or from the Battery to West Fifty-ninth street.

The physical characteristics of the North river must regulate the class of construction which can be put there. At the Battery rock is found at comparatively moderate depths (less than fifty feet) below mean high water, and the depth to rock does not change materially below Barclay street; above Barclay street the rock becomes deeper, but continues at a depth not far from eighty feet at the bulkhead line and somewhat less on the pierhead line to Leroy street; the depth there increases: it is one hundred and twenty-four feet at Christopher street, and nearly two hundred feet at Fourteenth street, and these extreme depths continue to Thirty-fourth street; above Thirty-fourth street the rock rises rapidly on the bulkhead line, but continues very deep

on the pierhead line. Over this rock is a deposit, which, though it contains in some places fairly good sand, may generally be described as mud; it has, practically, no carrying capacity, and any weight resting on its surface sinks into it at once. Any construction built along the North river, from Barclay street to Thirty-fourth street, must be built in this mud; it is entirely a case of mud flotation; the structures can be sustained only by making them a part of the mud. Above Thirty-fourth street the same condition may be said to exist with the piers, though better foundation can be found for the bulkhead wall.

It becomes important to consider what the real nature of mud flotation is. A pile driven into mud is surrounded by the mud, which adheres and sticks to its surface; the pile becomes, as it were, a part of the mud and it stands there; in this way, a single pile can be put down so that it stands practically firmly. On the other hand, though the pile cannot be moved in the mud, the mud itself is a soft, compressible material, and the pile foundation can bear no more than the mass of mud; the piles cannot settle in the mud, but they cannot help settling with the mud. If, therefore, a weight is put on the mass of piles in a pier exceeding that which the mud itself can bear, the mud and the structure will go down together as a whole. This is the invariable experience with structures built in this way. The movement, being that of a large mass, is slow, but it is no less real, and the fact that a pier, carrying 500 pounds per foot is supported by a thousand piles, is no evidence that a pier of equal area supported by two thousand piles would not settle with a weight of a thousand pounds per square foot. The ultimate capacity is not measured by the supporting power of the separate piles, but by the supporting power of the medium in which the piles are embedded.

Below Barclay street the foundations for both piers and bulkheads can be carried to rock, and piers of indefinite capacity can be built. Above Fiftieth street, there is a short reach, where the depth to rock is very small; but the rock here has a rapid slope, and while the bulkhead wall can be built on rock without trouble, the piers must be floated in mud.

The general arrangement, which dates back to the plan of 1871, provides for a bulkhead wall about one hundred and eighty feet west of the old crib bulkheads (the latter having been very irregular in shape), so situated as to give a marginal street (including the old street) two hundred and fifty feet wide. This bulkhead wall is a permanent masonry construction. Outside of this bulkhead wall are projecting piers of varying lengths, reaching from the bulkhead line to the pierhead line. Between West Eleventh and West Fourteenth streets, the bulkhead line of 1871 was so near the pierhead line as to virtually eliminate the piers.

As the bulkhead wall is a retaining wall, which has to resist the horizontal thrust of the earth-filling behind it, and both that earth-filling and the wall itself are floated in mud, the problem of providing a permanent construction becomes a very unusual one. To build a retaining wall on solid foundation is a simple problem. To build a wall to carry vertical weight only, on a soft foundation, is more difficult. To float a wall in mud, when that wall must also take a horizontal thrust, is a problem which can only be solved by care and experience, no formulæ or mathematical rules being available. The wall, as now built, is a satisfactory solution of this problem. Your Board believes it to be a unique construction, one which is worthy of the most careful study, and deserves the strongest commendation. The masonry wall is carried on piles, and so floated in the mud; it, however, is not the real retaining wall, but simply

a substantial facing, which gives a permanent finish of convenient shape; the same pile foundation extends back of the wall, and is filled in and around with a mass of rip-rap, which distributes the weight over a large area of the mud, while the whole is braced up by piles driven at an angle; the real retaining wall is the combined mass of rip-rap, masonry and piles, the whole floated in such a mass of mud that it is practically consolidated into one mass. The fact that this wall has settled in places is exactly what was to be expected; it is no proof of weakness or instability; the wall is simply the finished edge of the two hundred and fifty foot marginal way, and the whole has settled together; so long as it performs its duty of furnishing practically a vertical surface on the water side of this way, it is perfectly successful. The function of this wall is that of a practical tool; it is not a monument; though handsome, it is not intended for ornament; it performs none of the functions of the foundation of a building; its development has been gradual, and it is probable that future improvements will be made; but this Board does not hesitate to say that it considers this wall a solution of a very difficult problem, which is remarkable for its originality and the excellence of its results.

With the exception of Pier 1, which was apparently designed for a monumental work, the piers are simply the best examples of a form of construction which is in almost universal use in American seaports. This Board has examined the details of the plans. The piers consist of piles capped by twelve-inch by twelve-inch timbers, covered with planks, and provided with such braces and special protections as are needed to resist the blows of passing ice and of vessels which strike them; they are admirably adapted to their duties, and probably quite as expensive structures as it is now wise to float in mud. The only objection that can be raised is the perishable character of the timber, and so long as the piers must be founded on piles, which is by far the best way of securing mud flotation, we know of no better form of construction which promises sufficient permanence to justify its increased cost.

Plans have been prepared for a more permanent structure, and one constructed above high water, of fireproof material. This structure would be virtually permanent, except for the action of the teredo on the piles, an action which is now generally very slow though somewhat irregular. While the construction of one such pier would be interesting and desirable as testing the advantages of more permanent work, this Board is not yet prepared to recommend such construction.

Below Barclay street, where at present the city owns comparatively little property, foundations could be sunk to the rock, and it might be wise to estimate on more permanent work, but it must be remembered that the rapid changes in the ocean marine of the last twenty years have called for corresponding changes in piers and docks, and that it is probable that expensive permanent piers may have to give place to work of different dimensions, before the value of their increased cost has been realized.

The North river, as now available for steamship purposes, practically extends from the Battery to the property of the New York Central and Hudson River Railroad Company at Fifty-ninth street. This reach is cut in two by the portion between West Eleventh and West Fourteenth street, where the piers are so short as not to be available for steamship use. Plans which have recently been adopted provide for a change in the location of the bulkhead wall between Charles and Gansevoort streets, so as to permit of the construction of long piers. These long piers cannot be carried above Gansevoort street without removing the New West Washington Market, so that Gansevoort street practically divides the North river front into two parts. While

above Twenty-third street there is a reach which is well adapted to steamship service, and is already used in this way, it is the portion below Gansevoort street which now needs special consideration without prejudice, however, to similar developments above.

The length, measured on the bulkhead line, from the Battery to Gansevoort street is 13,439 feet—a little more than two and one-half miles. Of this 8,089 feet—about one and one-half miles—belongs to the city; 3,433 feet belongs to various private owners, and 1,917 feet to railroads. The city owns about sixty per cent. of the whole.

The present use of the 13,439 feet is as follows:

Foreign steamship lines	1,779	feet
Coasting steamship lines	1,861	"
		3,640 feet.
Railroads		3,883 "
Ferries		1,116 "
Miscellaneous, including inland steamboat lines.....		4,800 "
		13,439 "

In other words, of the two and a half miles of water-front which are better adapted than any other to the use of the class of commerce on which the prosperity of New York is most dependent, only 13.24 per cent. is now occupied by foreign steamship lines, and only 27.08 per cent. is occupied by all classes of ocean steamships, while 28.89 per cent. is occupied by railroads.

The ferries must remain where they are. Facilities must be provided for railroads and for North river steamboats (though the transfer of the latter to points above Gansevoort street should be considered). If the ferries, railroads and miscellaneous uses could be confirmed to a total length of one-half mile, there would remain two miles available for ocean steamers. This would provide thirty to thirty-five first-class steamship piers, which would accommodate all the steamships now landing on both sides of the North river, besides leaving a considerable margin for the growth of commerce. It appears to this Board that the first thing to consider is what methods can be adopted to bring about this result.

In the first place, the general principle should be followed of always, when making leases, giving preference to the class of traffic for which this portion of the harbor is specially adapted. Steamship lines should always be given preference over any other class of traffic. Existing leases cannot be interfered with, but prior occupation should have no rights in preference to class of service. If a steamship line wishes space now occupied by a railroad or a river boat line it should be given that space at the expiration of the tenant's lease, without reference to length of occupation by the tenant. Though the ferries must remain where they are, other locations can be found for the Sound steamers, and even for North river boats. The most difficult problem is that of the railroads, which call for special attention.

The old practice of the railroads terminating on the Jersey shore was to deliver and receive their freight in freight-houses on the west side of the river, from or to which it was transferred to or from piers on the New York side, these piers becoming the New York City freight stations. This practice has gradually undergone a change, till instead of being loaded or unloaded on the west side of the river, the cars are transferred across the river on floats. As a rule the cars are not removed from these floats,

but are loaded and unloaded while standing on the floats in slips; in other words, the slips which might be used for ocean commerce are converted into space to stand cars while loading and unloading local freight, a service which could be perfectly well performed on land. At the foot of Twenty-third street the Erie Railroad adopts a different course, and the cars, when once brought across the river are transferred from the float to a yard on shore, where they remain while they are loaded and unloaded. If this same principle could be applied to all the railroads terminating in New Jersey, perhaps four ferries, each occupying a width not exceeding 150 feet, or a total of 600 feet, could do all the work for which the railroads now use 3,883 feet. This would effect a saving of 3,283 feet, or nearly twice the frontage now occupied by all the foreign steamship lines.

After these criticisms of the present method of use of the North river water-front and suggestions of the modifications desired, the actual changes necessary to accomplish the desired results must be considered.

No material changes in the piers are desirable. As now built, these piers serve their purpose admirably. The plan adopted by some of the steamship lines, of two-story sheds, the best example of which is pier 14, would seem to give as much capacity as is desired on a pier. It must be remembered that the imports of this port are generally manufactured goods consigned to New York houses, and for the most part unloaded directly on the piers, the lighter and more valuable being landed on the upper floor of the sheds, and the coarser and heavier articles on the lower deck. On the other hand, the outward cargoes consist mostly of grain, cotton and other agricultural products, which are received in New York either by railroads or coasting steamers, taken to the steamships on lighters, and not landed on the piers at all, the lighters coming alongside the steamships and transferring their cargoes directly. Furthermore, the weight which a two-story pier of this kind may be called upon to bear, probably approaches the limit of safe mud flotation, and while warehouses of large capacity could safely be built on piers founded on rock, this Board believes it to be very unwise to attempt this class of construction above Barclay street. It is to be understood that this observation relates to the construction of warehouses properly so called, designed to receive and hold goods on storage for considerable periods of time, and not to the construction of two or three-story pier sheds, fitted with power systems of conveyors, for increased facility in loading and unloading steamers. The advisability of the construction of such improved pier sheds, capable of holding considerable quantities of merchandise in transit, is left for consideration in a future report.

On the other hand, there is one change in the use of piers which has already begun, and which could be extended to very great advantage. This Board believes that the entire passenger service, both of ferries and steamship lines, should be handled on the second story, and that the passengers should be taken across the marginal street on bridges, leaving the street itself entirely free for freight traffic.

While your Board has but slight recommendations to make with regard to the piers, the case is different with the marginal street. The plans of the Department provide for a marginal street two hundred and fifty feet wide between the Battery and Charles street. From Charles street to Gansevoort street, where the improvement is not yet begun, this width is reduced to one hundred and fifty feet, so as to provide longer piers. The original width of West street was generally seventy feet, the additional one hundred and eighty feet being added when the present bulkhead line was established. While this broad marginal street has been looked upon as an ornament

to the city, it must be remembered that the water-front of the city is for use rather than for ornament, and the functions of the Department of Docks is to provide facilities which will increase the commerce of the city, and not to ornament it. The proper use of the marginal street is entirely a commercial one. After reserving so much of the eastern part of the marginal street as is necessary for ordinary street purposes, the remainder should be treated in that way which will best facilitate the handling of ocean-borne freight. In other words the greater part of the street should be used in connection with the piers. To accomplish this result in the best manner, the suggestion already made, of transferring all passenger service to overhead bridges, is the first requirement. With the passenger service removed from the surface, the street may be divided into longitudinal sections, each devoted to a different use.

The practice already prevails of allowing the fifty feet immediately back of the bulkhead line to be occupied by sheds used in connection with the service on the piers. Your Board believes that this practice should be allowed everywhere below Charles street, thus reducing the apparent width of the marginal street to two hundred feet, a width which can readily be crossed by single-span bridges for passenger traffic. The tenants of the piers and bulkheads should be allowed to use the next eighty feet for the storage of such heavy commodities as can safely be stored in the open air, these generally being of a class which would not be left very long in this position; this will leave a space of one hundred and twenty feet between the storage limit and the east line of the street.

In the reach between Charles and Gansevoort streets, where the marginal street is but one hundred and fifty feet wide, until the east line of this street can be moved back, no sheds should be allowed on the bulkhead, and storage should be limited to the thirty feet adjoining the bulkhead wall.

The next fifty feet should be applied to railroad facilities designed to connect the piers with freight stations on shore, and with points of delivery of car floats along the water-front. As this feature of the general plan of water front improvement will be of slow development, your Board will reserve the discussion of its details for a future report.

The remainder of the street, ample for all the street-car and trucking purposes to which it is now applied, would be occupied as it is at present.

The outlines so far given are simply those of the physical plan. To carry it out requires not only engineering, but legal powers; it involves the adaptation of the marginal street to freight traffic in connection with the piers, and the relieving of that street from other traffic by the construction of over-head bridges. These bridges could be used, if it were thought best, not only for passenger traffic, but to transfer goods from the second stories of pier sheds to warehouses located on the east side of the street. In other words, this whole street would become a part of the dock system and should all be placed under the control of the Department of Docks, so that the limit of its jurisdiction should be the east side of the street and not a more westerly line. The proposed railroad should belong to and be operated under the control of the Department of Docks.

In this connection, attention is called to a modification which we think should be made in the line of the bulkhead wall. This wall has been built along the line of 1871 to Pier 47, where the wall is about six hundred feet west of the east line of West street. This does not interfere with the immediate use of this portion of the water-front, which is occupied by the oyster boats, but it reduces the front available for large

steamers, besides forming a pocket in the bulkhead-line which will interfere with the tidal currents. This Board believes that the wall as now constructed above Pier 45 should be removed, and reconstructed in a northeasterly direction from Pier 45 to a connection with the newly established line on the north side of Pier 46. When this is done, the propriety of removing the oyster boats from their present location to a point above Gansevoort street and adjoining the New West Washington Market, should be considered.

It will be observed that these suggestions, made with a view to securing a larger usefulness of the water-front, do not involve any change in the methods of construction or in the work now being done by the Dock Department; they simply provide for additional facilities to supplement the work which is now being constructed and outline a general plan under which the North river front can gradually be put in such shape that it will accommodate all the steamship lines which seek this port. In saying "all the steamship lines," your Board does not mean that every ocean steamer arriving in the port of New York would be expected to land on the North river; there are many "tramps" and smaller coasting vessels which come here either with or for specific cargoes, and which must continue to go to points on the East river, in Brooklyn, or on the Jersey side; these steamers, which handle a very important portion of the commerce of the port, could not be collected in any one place; it is the regular lines, which handle miscellaneous traffic and sail on regular days, that need the accommodation of the North river water-front.

There is one other subject matter to which it seems right to call attention. The port of New York is not only in competition with other American ports for the transatlantic trade, but it must soon be an important competitor with English and other European ports for the trade of Central and South America and other foreign countries. If our country is to compete with England in these trades, our ports must furnish the same facilities for the care of shipping that the English ports provide. If we are again to develop a great carrying trade, our ports must be adapted to the care of the ships handling that trade.

While well-coppered wooden ships remain clean for years, every iron ship becomes foul from the growth of barnacles and other organic life, so that it has to be docked and cleaned at least every six months, and if engaged in tropical waters, oftener. This has been recognized in England, and extensive and convenient facilities for docking and cleaning ships are provided everywhere. In the port of Liverpool there are twenty-two graving docks; and these are not grouped together, but are scattered through the dock system of the port, so that a ship, after unloading her cargo, can be docked and cleaned with the least possible delay, returned to her berth, and loaded. The port of Southampton, a second-rate port in business, has five graving docks, one of which is seven hundred and fifty feet long on the floor. Furthermore, these docks are not private property, but a part of the port system, and all of them are of substantial masonry construction.

The contrast between this and the condition of the port of New York is very marked; there are a number of floating docks on the East river, but the only fixed graving docks available for general commercial use are the two Simpson timber docks at the Erie Basin in Brooklyn, which are remote from the steamship piers, and neither of which is large enough to take in a modern Atlantic liner. There are two graving docks in the Brooklyn Navy Yard—one of stone and one of timber—while a third, now under construction, when completed, will be just large enough to take in the

steamship *Lucania*, but more than one hundred feet shorter than the new Southampton dock. Furthermore, these navy yard docks are built primarily for the use of the navy; they are inconveniently situated for merchant vessels, and merchant vessels must always wait for naval vessels. The steamers of the American line, when they are laid off for their annual overhauling, have now to be taken from their pier on the North river, about three hundred miles, to Newport News where they are docked, and are then either brought back to New York or taken to Cramps' yard in Philadelphia for such other work as may be needed. At Southampton the same ships are docked within a steamer's length of the loading berth.

It appears to this Board that the provision of suitable graving docks is a proper function of the Department of Docks, and that facilities similar to those furnished in Liverpool and Southampton should be furnished in the port of New York. Furthermore, these docks should not be private enterprises, but a part of the New York dock system, under the control of the Department of Docks; the charges being made with reference to the encouragement of the commerce of the port rather than to the profit of their owners.

To accommodate the shipping which will be berthed on the North river, the graving docks should be located on the North river, where a steamer could be taken from her berth to the dock on a single tide, with the least possible expense and delay, and brought back to her berth in the same manner.

While it is possible to build graving docks on soft materials, and many of the English docks have been built in this way, there is a very great advantage in economy, of both construction and maintenance, in having a rock foundation. Fortunately, a good site for this purpose is found on the North river, between Forty-ninth and Fifty-third streets, where graving docks could be excavated entirely from solid rock, and where the rock on the bulkhead line is nowhere more than forty feet below mean high water. Of course, the docks must be put entirely back of the bulkhead line, and it might be expedient to put the gates on the shore line of the marginal street. The length of the blocks from the marginal street to Eleventh avenue is about eight hundred feet, offering room for a dock of the same dimensions as the largest Southampton dock; and this length could ultimately be increased to over a thousand feet by placing an additional abutment on the bulkhead line, against which a caisson gate could close. Apparently, the two blocks between Fiftieth and Fifty-second streets are best adapted for this purpose, and three docks could be built on these two blocks. It would seem expedient to acquire at least three (possibly four) blocks, with a view to ultimately increasing the number of docks to five or seven. Of course, not all of these docks would be of the maximum size.

While this may seem a radical departure in the practice of the Department of Docks, this Board believes it to be a most important matter, and commends it to your careful consideration.

This report has been confined to the North river, and principally to the portion of that river below Gansevoort street. It is important to supplement it with a few references to other features of the harbor.

Nothing that has been said of the improvement between the Battery and Gansevoort street is intended to imply that improvements, actual or proposed, above Gansevoort street, should be discontinued. This Board has simply, in the limited time now at its disposal, confined itself to that part of the North river front which has become the most important part of the dock system.

When the City acquires the front below Barclay street, it may be expedient to consider the construction of piers of more permanent character, and capable of carrying greater weights than the present pile piers. This, however, is a matter which should be taken up very carefully before changes are actually made.

We have not yet been able to reach favorable conclusions upon the proposition for building warehouses upon piers. A warehouse is not intended for the handling of goods as much as for storage; it is often more important that a warehouse be accessible for land transportation than for water transportation; a warehouse on a pier would be accessible on both sides for water transportation, but only on one narrow end for land transportation. A warehouse on the east side of West street which could be approached on all sides and be connected with the pier by an overhead bridge, would be more serviceable than one on the pier. Unless the action of waves from passing steamers should furnish an insuperable objection, the East River offers opportunities for warehouses built on rock foundation, which would be accessible on one side from land and on the other from water. This means that vessels would lie along the bulkhead-wall and not along piers, but on the narrow part of that river no piers can be built. This board has not gone into details of this scheme, but simply calls your attention to the fact that the East river may furnish facilities of this kind which have a bearing on the whole question. It must be remembered that the regular Atlantic steamers cannot afford to go to any one warehouse; their business is a general one; if their goods are to go to warehouses, they can be conveniently taken to them by lighters; the vessels which would themselves go to warehouses are the tramp steamers and sailing ships.

This Board recognizes that while the suggestions made do not involve any changes in the methods of construction now in use, they mean some radical changes in the use and development of the North river front, especially as regards the accommodation given to railroads. While the Board feels positive that this is the course which should be pursued, and that all work which can be done on land should be taken from the water, it must not be understood that these changes would be made at once or be of a sudden character; they could only be carried out as leases expire, as property now owned by private individuals and railroads is acquired by the City, and as steamship lines demand and need property now occupied in other ways. It would be a gradual and not an immediate change.

Respectfully submitted,

THOS. LINCOLN CASEY,
GEO. S. MORISON,
WM. H. BURR.

OFFICE OF THE BOARD OF CONSULTING ENGINEERS,
NEW YORK, October 6, 1896.

To the Board of Docks:

In our report of February 6, 1896, for reasons stated therein, we confined ourselves to the North river water-front, making only brief reference to other sections. We now submit a short report covering the East river.

For convenience of description the East river may be divided into four sections: the first extending from the Battery to Grand street, the second from Grand street to Fourteenth street, the third from Fourteenth to Thirty-fourth street, and the fourth

from Thirty-fourth to One Hundredth street, One Hundredth street being recognized in the Dock Department as the division between the East river and the Harlem river. These four sections will be considered separately.

The section of the East river from the Battery to Grand street is at present the only part of that river which is used for general traffic. The piers above Grand street accommodate, for the most part, some special local uses. This section is narrow and has a strong tidal current, while the frequent ferries, which must necessarily be maintained here, impede traffic in what even without them would be a very crowded river. This section is divided near the middle by the East River Bridge. Although general plans were prepared for a marginal street and piers on the East river at the same time as for the North river, nothing has yet been done in construction on these lines, the old streets and piers remaining substantially as they were thirty years ago.

The portion of this section below the East River Bridge is occupied by small piers, most of them uncovered and largely belonging to private owners. It has been the part of the New York water-front frequented by sailing vessels engaged on long voyages, the Australian, East Indian and Californian packets being generally berthed here. The lower part of this section has always been reserved for canal boats, although the location does not appear to be a convenient one.

Above the East River Bridge, this section of the water-front is used largely for railroad purposes, the New York, New Haven and Hartford Railroad occupying 809 feet of frontage, and in part by floating and other dry docks, 530 feet of frontage being taken up in this way.

At the request of your Board, statistics were collected showing the changes in the foreign business done by sailing vessels at this port for the last ten years. These show a steady decrease in the number and tonnage of sailing vessels engaged in this trade. There would seem to be no reason why, if the section of the water-front between the Battery and the East River Bridge has accommodated this business in the past, it should not be more than equal to accommodate it in the future. This business is now done principally on uncovered piers; your Board can see no reason why this class of traffic would not be better accommodated on covered than on open piers, and if the piers were covered they could be used for tramp steamers and other purposes, when not required for sailing vessels. The objection to shedding these piers is peculiar, and one which it seems should be remedied by legislation. As the law now is, we understand that a sailing vessel requiring accommodations can claim the right to a berth at any uncovered pier not in use on paying the regular wharfage charges; as soon, however, as the lessee of the pier has put a shed on it, this right ceases, and the lessee has the exclusive control of the pier. Your Board recommends that steps be taken to secure legislation by which the right to build sheds and to have the exclusive use of the piers, may be separated at the discretion of the Board of Docks, so that it may have the authority to allow sheds to be built on piers without at the same time giving an exclusive use of the same.

The Board of Consulting Engineers has no recommendations to make at this time as to the sizes of piers or method of construction on this river, though it is of the opinion that the methods of construction now in use in the Department, subject to such minor changes as are usually made when work is actually begun, are substantially as they should be. The plans show a curved bulkhead line at the bend of the river immediately below Grand street; this curve would look well and might make an attractive feature in the water-front, but it interferes very materially with the use of this part

of it, as a ship cannot be berthed on a curved wall. The present arrangement of angular construction, which has proved very useful, gives opportunity to berth ships at warehouses, and we recommend that the shape of the bulkhead wall be revised on something resembling the lines which now exist. The general plans, however, involve a careful study of the railroad problem, which must be made the subject of a future report.

As already stated, the lower part of this section is occupied as a harbor for canal boats, which are laid up there to be sent to the different points where they are to discharge their cargoes. All of these canal boats come down the Hudson river, and there would seem to be no good reason why they should not be laid up on that river instead of on the East river. A harbor for canal boats could easily be arranged in the upper part of the North river front, and while there would undoubtedly be opposition to transferring this whole interest at once, and it could not be done without legislation, we believe that steps should be taken to bring it about gradually.

The use of the river above the East River Bridge is a matter which calls for careful consideration. In our report of February 6, 1896, we stated that the method of accommodating railroads on the marginal street along the North River should be made the subject of a further communication. The railroad accommodation on the East river should be considered at the same time. The subject is one of very great importance, and, so far as the East river is concerned, it will probably call for some radical changes. If a large portion of the freight traffic of the New York, New Haven and Hartford Railroad has to be accommodated in this section of the city, that railroad already running its trains into the city proper, it would seem as if some method should be devised by which the railroad should reach this district by land rather than by water.

There is no other portion of the city in which ferries are so close together as here, and this is a necessary condition. Adjoining the Battery are concentrated a number of ferries running to Staten Island, Bay Ridge and the more easterly parts of Brooklyn, all, however, within the limits of Greater New York. The question should be considered whether these ferries could not be accommodated together in a single large ferry-house, in a way which would at once offer better accommodations to the public and occupy less space on the water-front.

The second section extends from Grand street to Fourteenth street. On this section, 472 feet of bulkhead-wall have been built and four piers, according to the standard plans. This portion of the river is narrow and does not seem to be well adapted to anything but local uses. The plans which are now being followed in its improvement seem to be good, and we have no recommendations to make concerning them.

Your Board has examined carefully the section of the bulkhead-wall at the foot of Stanton street, where a crack occurred. While such an accident is one of those things which an engineer is always sorry to have occur, your Board cannot see that any serious damage has been done, or that anything will suffer except in appearance.

The third section extends from Fourteenth street to Thirty-fourth street. Here the river is wider than either above or below, the tidal current is consequently less, and the water-front is better adapted to general uses. The portion of this section above Twenty-third street has already been improved, the bulkhead-wall following the line approved by the Secretary of War, and the piers being built parallel to the street and not at right angles to the bulkhead-wall. This district is now used by the city for various purposes, and is probably more useful in this way than in any other. The dis-

trict between Fourteenth street and Twenty-third street has been only slightly improved, the only pier constructed on the new plan being the pier at the foot of Eighteenth street. Your Board, regarding this district as a very valuable section of the New York water-front, believes that all improvements should be made with reference to making it the terminus of steamers navigating Long Island Sound, and that, with this end in view, some modification should be made in the plans. The location of the bulkhead-wall is all right. The average distance from this bulkhead-line to the pier-head-line is about 460 feet; the largest steamer now navigating Long Island Sound is 426 feet long. Your Board believes that when piers are built here they should be built at right angles to the bulkhead-wall, as this will not only permit the construction of a greater number of piers, but will place them in a more convenient position for the landing and departure of steamers.

The transfer of the Sound steamboat lines from the North river to the East river is a matter of very great importance, but it involves so many questions that it must be handled with a great deal of care. So far as passenger travel is concerned there would seem to be no doubt that this location near the foot of East Twenty-third street would accommodate the traveling public very much better than the present termini in the lower part of the city. Those people whose business is in New York City would undoubtedly prefer the Twenty-third street location, especially as the boats could sail from this terminus at least one-half hour later than from their present piers. The Sound lines, however, have always exchanged a large number of passengers with the railroads terminating in Jersey City, and the present piers are convenient for this traffic. On the other hand, the Erie Railroad has for many years maintained a ferry to the foot of West Twenty-third street, and the Pennsylvania Railroad is about opening a ferry to the same point. With these two ferries in operation, and the Twenty-third Street Railroad operated as a cable line, the transfer from Jersey City to the foot of East Twenty-third street would be little more difficult than to the piers on West street, from which the boats now run, and if an allowance be made for the difference between sailing times from the North river piers and the East river piers, the actual time consumed by passengers between Jersey City and Hell Gate would be less than by the present route. The only difficulty which your Board sees would relate to the convenience of delivery of freight, and on this we are not prepared to speak without further investigations.

The fourth section of the East river extends from Thirty-fourth street to One Hundredth street. The river here is very narrow and has a rocky shore, and excepting in one small cove, and for a short distance at the upper end of the section, there is no opportunity for the construction of piers. A marginal way has been laid out for the whole distance, and work is in progress at various points. Your Board sees no reason at this time to make any suggestions for changes in the plans now in use, and believes that for the great part of this section, a bulkhead alongside of which vessels can be landed for local convenience is the best method of improving this front. In this connection, however, your Board would call attention to the fact that railroads should be given some accommodations on this marginal way in the same manner as on the North river front. This, however, is a very complicated question, and as hitherto stated, must be reserved for further consideration.

Respectfully submitted,

(Signed) GEO. S. MORISON.

(Signed) WM. H. BURR.

(Signed) WM. P. CRAIGHILL.

NEW YORK, April 30, 1897.

To the Board of Docks:

Gentlemen.—In the report of February 6, 1896, the Board of Consulting Engineers stated that while it had but slight recommendations to make with regard to the piers along the North river, the case was different with regard to the marginal street, and said as follows:

“The proper use of the marginal street is entirely a commercial one. After reserving so much of the eastern part of the marginal street as is necessary for ordinary street purposes, the remainder should be treated in that way which will best facilitate the handling of ocean-borne freight. In other words, the greater part of the street should be used in connection with the piers. To accomplish this result in the best manner the suggestion already made of transferring all passenger service to overhead bridges is the first requirement. With the passenger service removed from the surface, the street may be divided into longitudinal sections, each devoted to a different use.

“The practice already prevails of allowing the fifty feet immediately back of the bulkhead line to be occupied by sheds used in connection with the service on the piers. Your Board believes that this practice should be allowed everywhere below Charles street, thus reducing the apparent width of the marginal street to two hundred feet, a width which can readily be crossed by single-span bridges for passenger traffic. The tenants of the piers and bulkheads should be allowed to use the next eighty feet for the storage of such heavy commodities as can safely be stored in the open air, these generally being of a class which would not be left very long in this position; this will leave a space of one hundred and twenty feet between the storage limit and the east line of the street.

“In the reach between Charles and Gansevoort streets, where the marginal street is but one hundred and fifty feet wide, until the east line of this street can be moved back, no sheds should be allowed on the bulkhead, and storage should be limited to the thirty feet adjoining the bulkhead wall.

“The next fifty feet should be applied to railroad facilities designed to connect the piers with freight stations on shore and with points of delivery of car floats along the water-front. As this feature of the general plan of water front improvements will be of slow development, your Board will reserve the discussion of its details for a future report.”

In the report of October 6, 1896, upon the improvement of the water-front on the East river, the Board of Consulting Engineers said as follows:

“In our report of February 6, 1896, we stated that the method of accommodating railroads on the marginal street along the North river should be made the subject of a further communication. The railroad accommodation on the East river should be considered at the same time. The subject is one of very great importance, and, so far as the East river is concerned, it will probably call for some radical changes. If a large portion of the freight traffic of the New York, New Haven and Hartford Railroad has to be accommodated in this section of the city, that railroad already running its trains into the city proper, it would seem as if some method should be devised by which the railroad should reach this district by land rather than by water.

Appreciating the very great importance of railroad connection with the water-front in New York City, your Board has carefully studied the entire water-front on both rivers, going over a considerable portion of the line on foot, and also visiting that part of the Brooklyn water-front where railroad tracks have been laid in connection with float

landings, so that any railroad having a terminus about the harbor of New York can place its cars alongside steamers or at the doors of warehouses.

The water-front of New York City, both on the North river and on the East river, suffers seriously from a lack of proper facilities for the interchange of freight between the railroads which reach the shores of the harbor and the shipping which enters the port. It has seemed to your Board that the present condition of commerce in the port of New York calls for material improvement in existing facilities for the exchange of freight between land and water transportation. Goods brought to the piers, whether they come by railroad or from within the city, are subject to inconvenient and expensive methods of handling. In but few instances can railroad cars be run upon the piers on the New York water-front. Better methods of handling large quantities of freight are found in rival ports, and their existence is demanded in New York City. It has been the purpose of your Board to recommend such a disposition of the facilities offered by the marginal way as will give permanent relief from these difficulties, difficulties which have received much attention from the larger commercial bodies of the city during the past two years.

The principal end is to facilitate the interchange of traffic between land and water lines of transportation, and at the same time improve the means of reaching either class of transportation from the city. This means an arrangement by which railroads can place their cars alongside ships as they lie at the piers, and also run their cars directly to conveniently-located storage warehouses. At the same time it is essential that the land approaches by which teams reach the piers should be as free as possible, and that this freedom of approach should extend to the railroad tracks as well as to the piers.

It must be borne in mind that it is highly probable that before many years, street railroad tracks will perform a service which has not yet been undertaken in New York City. Electric and other mechanical power is rapidly superseding horse power for passenger traffic. With the greater power which is thus available, the same tracks which are used during the busy hours of the day for the distribution of passengers may be used at other times for the distribution of freight, and it is quite possible that much of the business which is now handled by drays and trucks will, before many years, be handled by electric cars. Your Board does not deem it a part of its duty to go into a study of this question, but simply makes the suggestion as showing the very great importance which may possibly attach to surface tracks laid along the water-front.

Your Board has carefully considered whether freight service could be satisfactorily accommodated by an elevated railroad along the water-front and has come to the conclusion that such a structure could never give as efficient service as a surface freight railroad. Freight traffic is the heaviest, measured in tonnage, which can possibly be done, and the general principle of keeping the centre of gravity low should be applied to this case.

Any railroad, whether surface or elevated, which may run along the water-front of New York City, either on the North or the East river, must receive many cars from floats on which they are brought from the various railroad termini about the harbor. If the tracks are elevated, it would be necessary to have heavy grades at landing points or to use floats with elevated tracks on them, either of which would be a very objectionable arrangement. The piers and the sheds on them would need to be materially strengthened at large expense, to carry railroad traffic on the second floor. Spur tracks from an elevated system leading into freight stations on the city side of

the marginal way would deliver cars at an inconvenient elevation above the street, requiring special appliances for delivering and receiving freight and involving increased cost of freight stations. Tracks with working grades reaching the street level would not be feasible on either the North or the East river front. A very careful investigation of this feature of the water-front improvement has impressed your Board with the conviction that there should be no attempt to place the desired railroad freight facilities of the water-front above the surface of the ground, on account of the great expense it would involve and the other objections pointed out above. If, as at present, it is necessary to handle both a heavy freight traffic and a large passenger traffic along the water-front, it is the judgment of your Board that when they cannot both be accommodated on the surface, the passenger traffic should be placed above.

A freight railroad along the river-front must not be regarded as a through line over which trains would run, but simply as a long, narrow yard used entirely for switching purposes and for standing cars in convenient positions; but it must be remembered that property here is too valuable for the storage of cars, and they should be left standing no longer than is necessary for loading and unloading. This means that there must be two main tracks kept clear for the quick moving of cars, and additional tracks on which cars can be placed, which latter must be accessible for loading and unloading. The only system which seems to meet these conditions is that of a four-track railroad, the two middle tracks being kept open as main lines, to be operated by switching engines, but on them no cars should be allowed to stand. The two outside tracks would be used to stand cars on, and these car tracks should be so situated that the cars on them can be approached by trucks or teams. Spur tracks should be run from the outside track on the water side to piers whenever desired by lessees, and similar tracks should be run from the outside track on the land side into adjoining property, whenever owners desire to use it in this way. With this system there would be complete railroad communication with every pier on the water-front, and the blocks adjacent to the marginal way would be available for freight stations and for warehouses, and cars could be run directly into such stations or warehouses.

If the four tracks are laid twelve feet between centres, the customary width in this part of the country, the width of the four tracks from rail to rail would be forty-one feet; the width measured to the outside of freight cars standing on them will be forty-five feet; the width between proper clearance lines seven feet from the centre of each outside track, will be fifty feet. In the report of February 6, 1896, the Board located this fifty-foot strip next to a street seventy feet wide; on further thought, it is believed that this strip should be placed nearer to the river, and that sufficient space should be allowed between the first track and the margin of a seventy-foot street, to allow teams to load into cars standing on this track, without encroaching on the seventy-foot street. It might be well to allow a permanent fence to be constructed, which should separate the portion of the marginal way used for street traffic from that used in connection with the railroad and piers; that is, a fence might be built along the present line of West street seventy feet from the building line, with gates at suitable intervals, through which teams could approach the piers. For this reason it seems proper to place the shore edge of the fifty-foot strip ninety feet from the building line of the marginal street; the water edge of this strip would then be one hundred and forty feet from the building line, leaving one hundred and ten feet between it and the bulkhead wall where the street is two hundred and fifty feet wide. As the centre of the outside track is seven feet from the edge of the fifty-foot way, and the fifty feet next to the

bulkhead wall is now occupied by sheds, the centre of the outer track would be sixty-seven feet from the face of the sheds. This will not permit tracks running onto the piers to make the whole turn outside of the shed line without objectionably sharp curvature, but by extending the curvature through the sheds and a short distance on the piers, curves of two hundred feet radius can generally be used, which are satisfactory for the purpose in view. In Brooklyn, curves of about eighty feet radius are now in use.

The distance of sixty feet between the track strip and the nearest building on the water side, is quite small enough; and it is believed that with tracks in the marginal way, and with an opportunity to load cars standing on the track nearest to the piers, this strip will be in constant demand for freight which can be handled in the open air.

The original plan for the improvement of the North river front contemplated a marginal way two hundred and fifty feet wide from the Battery north. The change made between Charles and Gansevoort streets to provide for the construction of long steamship piers reduces the width of this marginal way to one hundred and fifty feet. The proposed change of pierhead-line would enable piers slightly longer than have been proposed to be constructed here without encroaching on the two hundred and fifty feet way. Your Board considers that the maintenance of the full width is of the utmost importance, and that the plans of this part of the front should be revised, and the bulkhead wall located two hundred and fifty feet from the east side of West street, from Christopher street north to Gansevoort street, where the new West Washington Market now stands. The changes which are being made below Gansevoort street will involve changes between Gansevoort and Fourteenth streets, and perhaps even farther. Whenever they are made, the two hundred and fifty feet marginal way should be continued through this section.

On the East river a marginal way two hundred feet wide has been established, though not yet constructed, from the Battery to Corlears Hook. Above Corlears Hook the conditions are very irregular. Your Board believes that this two hundred feet marginal way along the East river is enough, provided no sheds are allowed along the bulkhead wall, but that any reduction of the width is inadvisable. The division of this two hundred feet would correspond precisely to the division of the two hundred and fifty feet on the North river, the bulkhead wall taking the place of the shed-line allowed on the two hundred and fifty feet way.

It would therefore appear that this system of railroad tracks can be laid along the North river from the Battery to Christopher street whenever the bulkhead wall is completed and when the obstructions which now occupy the way where the bulkhead wall has not been built are removed. As the tracks of the New York Central and Hudson River Railroad now come down West street as far as Canal street, communication would thus be given between that railroad and all the piers below Christopher street. Connections with other railroads must be made by floats in the same manner as at present in Brooklyn. Float landings can be put in at convenient intervals by railroads leasing water-front, but as it is important to save as much water-front as possible for what is properly ocean business, the number of float landings should be limited. To obviate this difficulty, your Board would suggest that the four tracks be made to terminate at the lower end just above Castle Garden, in an apron adapted to a four-track transfer boat capable of carrying ten cars on each track, or forty cars in all. The opportunity for a suitable landing for such a boat at that point is exceedingly good; the boat would carry a full train of forty cars, representing 1,000 tons of

freight, and would be able to handle cars much more rapidly and efficiently than any system of floats. Furthermore, the capacity would not be limited by the size of the boat, but by the speed with which it could be unloaded, as every railroad terminating in New York harbor could own or operate one or more boats of this class.

The extension of these tracks between Gansevoort and Fourteenth streets offers difficulties, the solution of which must be left until the permanent plans for the improvement of this part of the water-front are determined. Above Fourteenth street tracks can be laid and connected with the float landings which the Central Railroad of New Jersey, the Erie Railroad, and the Pennsylvania Railroad already have.

On the East river there is at present no opportunity for laying tracks of this kind; but a similar arrangement can be made between the Battery and Corlears Hook whenever the improvement of this section is made. There will be a good opportunity for a transfer-boat landing, similar to that proposed opposite Castle Garden, at the foot of Jackson street, and a float landing can be provided near the Battery. The system of ferry-houses immediately adjoining the Battery would probably interfere with the switching from a large transfer-boat at this point. In this connection, your Board would say that it considers that it would be a very great convenience if these tracks could be continued around Battery Park to connect with those on the North river, but it recognizes the very serious objections which would be raised to such an arrangement.

Such a system of surface tracks as is contemplated in this plan would serve the interests of all the parties which it affects. The increased facilities for receiving freight would be a decided advantage to all shipping interests, and the same facilities would be available for railroads, enabling them to run their cars to the points of most convenient freight delivery. The same advantages would accrue to railroads for the freight which ships would give them.

The full realization of the benefits from this railroad system would require the abandonment of the water-front now used by railroads for holding cars on floats while loading and unloading, but such abandonment could take place gradually, as station facilities can be acquired on the land side of the marginal way. The contemplated improvements may at first appear a hardship to the railroads, but it is believed that the ultimate result would be a decided advantage. The two outside tracks of the four-track system would furnish facilities for loading and unloading cars far superior to those now afforded by car floats. Three railroad lines, now reaching the New Jersey side of the North river, already have freight stations on the land side of the marginal way above Fourteenth street. Your Board appreciates that a change of method which requires the railroads to transfer their freight stations practically from water to land is a serious matter; the result should be attained gradually, but when it is reached, decided advantages will accrue to the railroads. With the method now in use drays and wagons deliver and receive freight along the street front of the sheds which occupy the bulkhead, while floats carrying cars are brought up to the bulkhead, lying in the slips between the piers. This freight is handled by hand trucks to points within the sheds, where it is sorted by stations, and then taken in the same way from these sorting points to cars standing on the floats. The worst congestion which now occurs on West street is due to the collection of teams waiting their turns at the unloading platforms. The plan contemplated provides for loading much of this freight directly into cars standing on tracks in the street, and also provides for freight stations at various points in the adjoining blocks, where freight can be delivered from side streets, without

creating any congestion on the marginal way. In loading and unloading cars on floats at the present time, it is necessary that all freight so received and discharged should be carted across West street, necessitating congested masses of trucks and carts along the bulkheads of such portions of the waterfront, to the great disadvantage of the handling of the freight itself, and a frequent stoppage of street traffic at these points. With free facilities for driving carts and trucks alongside cars standing on the two outer of the four tracks, supplemented by such freight stations as may be provided on the land side of the marginal way, much freight can be handled without crossing that way, and so much of it as might be received by or discharged from cars on the outer tracks would be carried to those tracks only, and in such order and system as would produce a minimum of troublesome congestion.

After carefully considering the general and particular situation above Corlears Hook, your Board has reluctantly come to the conclusion that it is inexpedient to consider any system of marginal way on which tracks could be laid along this section of the East river. The water-front between Corlears Hook and Fourteenth street is now generally occupied by lumber yards and other interests which require large storage room, and whose convenient operation would be very seriously interfered with if a marginal way were constructed. Interests which are best accommodated by yards fronting directly on the water, are now located along this part of the East river. No portion of the New York water-front is better adapted to such purposes, and it is the judgment of your Board that the interests located here should continue to enjoy such accommodation as they now have.

From Fourteenth street to Thirty-fourth street, a marginal way could be built and used in the same manner as elsewhere; but there is no immediate demand for it by itself, and it could not be used as an approach to connect with the rest of the front. Above Thirty-fourth street the general character of the bank is fatal to such a scheme; the Board does not mean that it could not be built, but the objections and difficulties of construction exceed any advantages which are likely to accrue. If any railroad line is to be built near the east water-front, it is believed that the best route to follow would be down First avenue, the line being partly in tunnel and partly elevated. This, however, is outside of the proper province of the work of this Board.

To sum up, your Board is of opinion that a system of railroad tracks in the marginal way can and should be provided along the North river, between Battery place and Christopher street, and that this should be extended further northward whenever room is available. There should also be a railroad system in the marginal way on the East river, extending from the Battery to Corlears Hook; this railroad to have no connections excepting with transfer boats and floats. It is believed that the consideration of any further system of freight railroad tracks at this time would be premature.

Having thus indicated the arrangement of freight railroad tracks which should be provided, the handling of other traffic must be taken up. In the first place, however, your Board believes that the construction of this system of tracks will materially reduce the amount of teaming along the marginal way, and that the demand on it for street purposes will be very much less than now. This will be especially the case if the surface tracks come into use in the business parts of the city for the distribution of freight. For the present, however, your Board is of opinion that the seventy feet width of the marginal way, corresponding to the old width of West street and South street, should be kept clear for the purposes for which it is now used.

Your Board further considers that passengers and other pedestrians should be kept off the surface of the marginal way, and that a series of bridges should be constructed, practically from every pier, to the shore side of the street, by which people can pass over the railroad tracks and the street to the piers. These bridges should be at least sixteen feet in the clear above the established street level, and preferably would terminate at the building line, with approaches through buildings fronting on the street; stairways similar to those now used at the stations of the elevated railroads might be permitted, but the other arrangement is preferable. With the double deck ferry boats now coming into general use, the bridges will not involve an unnecessary climb for ferry passengers. The pier sheds to which the bridges would lead would generally provide passenger accommodations on the second floor and it would be more convenient to mount the bridge than to thread one's way through the dangers of congested carts, trucks and street cars.

The surface passenger railway tracks might perhaps be left where they are, and it is hoped that the improvements would effect such a relief to the street traffic, that a fairly good service could be given (at present this service is slow and poor); as, however, the passengers on such cars would generally wish to reach the piers which are approached by overhead foot bridges, it might be well to place these cars on the elevated structure, the tracks being placed sufficiently high to pass over the foot bridge, the passengers reaching the bridges from the cars by the use of short stairways. Several plans for such an elevated railroad have been discussed; if used only for electric cars which would run elsewhere on the surface, a double track railroad on a single line of columns is entirely practicable; the two elevated tracks could be placed over the two middle tracks of the surface freight railroad, but this would involve an increase of the space between the surface tracks and careful study to place the columns in such position that they would not interfere with cross-overs and turnouts; the elevated tracks might be placed on the street side of the surface tracks, over the space where teams would stand when loading and unloading cars; they could be placed over the present street railroad tracks, or they could be carried on girders spanning the present street.

This elevation of the street car traffic along West street above the surface railroad tracks involves neither great expense nor serious inconvenience. Such elevated tracks would, in connection with the bridges crossing the marginal way afford convenient connections with all the piers along the water-front. Landing platforms could be provided at every pier and high speed could be attained by electric cars. A trip in these cars, whether short or long, would be agreeable. Baggage and express cars as well as passengers could be run. While the immediate construction of such an elevated street car track may not be necessary, your Board believes that the advantages accruing from such a line would justify its early adoption.

Your Board has described in this report a system which will make railroad connections between the piers on the water-front and the railroads which reach the harbor, this including railroad communication between the several piers. Your Board is thoroughly impressed with the importance of such an arrangement, and believes that it is the only method by which the port of New York can maintain its position among its rivals. The cost of such a four-track railroad system would be small; simply the expense of laying the tracks and these tracks including all switches should not cost more than eight thousand dollars per mile of single track.

Your Board has not entered into the method of operating the railroad. It

might be best to have the cars switched by some organization managed by the principal lessees, but the Board of Docks should retain control of the tracks and if necessary be prepared to do the switching itself.

Your Board believes that this railroad system is made clear by the description contained in this report, but if further information is desired the Board is prepared to furnish it, and can prepare plans showing cross-sections of the marginal way and the methods of approaching the piers, if it is thought best.

Respectfully submitted,

(Signed) GEO. S. MORISON.

(Signed) WM. H. BURR.

(Signed) WM. P. CRAIGHILL.

OFFICE OF THE BOARD OF CONSULTING ENGINEERS, }
NEW YORK, June 15th, 1897. }

TO THE BOARD OF DOCKS:

Gentlemen.—In reply to the following resolution passed by you on May 14th, 1897:

“Resolved, That the Board of Consulting Engineers be and is hereby requested to prepare plans showing cross-sections of the Marginal Way and method of approach to the piers referred to in their report of April 30th, 1897,”

this Board submits the following plans:

1. A plan, on a scale of ten feet to the inch, showing the arrangement of the four proposed surface railroad tracks in West Street, the westerly track being connected with a track leading to the centre of a pier by a curve of two hundred feet radius. The same plan shows the position of the proposed fence to separate West Street from the portion of the Marginal Way which is to be occupied by railroad tracks and used specially in connection with the water-front. It also shows the position of a passenger bridge connecting the second story of a pier shed with the east side of West Street, and the position of an overhead passenger railroad located immediately west of the seventy feet strip reserved for general traffic.

2. An elevation, on a scale of ten feet to the inch, showing the overhead passenger railroad, the passenger bridge in section, and in the background the front of the sheds built on a pier and on the fifty feet of the Marginal Way adjoining the bulkhead line.

3. A cross-section, on a scale of ten feet to the inch, of the Marginal Way showing the position of every track, the bulkhead wall and the shed on pier and adjoining portion of Marginal Way, the passenger bridge and the overhead passenger railroad.

4. A plan, on a scale of three hundred feet to the inch, showing the position of the four tracks in West Street, from the Battery to Gansevoort Street, together with switches leading to all the principal piers above Cortlandt Street, and suggested

switches leading into blocks on the east side of West Street. On this plan the piers are shown as of the full authorized length and the bulkhead wall in its established position, instead of as they now exist.

Your Board believes that these plans are sufficiently full to explain themselves, but they would call attention to a few special points.

The general position of the surface tracks is as given in the report of April 30th. The curves leading to the piers are all of two hundred feet radius, though, as these will only be used for switching purposes, sharper curves would be admissible. The curves leading into the blocks are all of the same radius, except the one leading into the block between Duane and Reade Streets, now occupied by the old Erie building, which is one hundred and twenty feet radius. This plan contemplates using the two central tracks as main tracks, and the two adjoining tracks as switching tracks, always running on the right-hand track, and as far as possible, always using trailing points. To meet these conditions, all the pier tracks are approached from the south and the land tracks from the north. Cross-overs would in every instance run south from a westerly track and north from an easterly track.

No connection is shown with any existing railroads, excepting by the large transfer boat at the Battery. A connection with the New York Central and Hudson River Railroad track could be made anywhere between Gansevoort and Canal Streets; it would probably be expedient to make connections at both these points, and to require the removal of the present tracks on West Street within these limits. A transfer boat to hold forty cars on four tracks would be 375 feet long. As the piers near Desbrosses Street are more than 800 feet long, if a transfer boat landing were provided on this section of the river, the cars could be pulled off the boat without switching across the bulkhead line, so that by taking the space now occupied by a pier and adjoining slip, a yard of very considerable capacity could be made there, though your Board does not consider that the use of the piers for yard purposes is to be encouraged.

The overhead passenger railroad is designed simply as a comparatively light elevated structure, over which street cars can be run, there being two passenger platforms at every overhead bridge so that the cars could stop at every pier, as they do now at every crossing. This overhead railroad could be brought to the ground by an inclined plane between Gansevoort and Bloomfield Streets, or it could be extended as much farther as is thought best. A similar inclined plane could be built in Christopher Street. The details by which the surface cars could be brought on this elevated structure, however, are susceptible of various solutions. At the lower end, it would perhaps be well to run this overhead railroad out on Pier 1, establishing a street railroad terminus for electric cars on the second story of that pier, which would conform well to its present use as an excursion pier. Between the piers, the posts supporting this overhead railroad are shown staggered, those on one track being half-way between those on the other track, this arrangement being adopted to allow switches to be run into the blocks on the east side of the street. If the double-track elevated structure supported by a single row of columns, to which allusion was made in our report of April 30th, 1897, should be adopted, it is probable that the columns could most advantageously be located along the line of the division fence.

Your Board would call special attention to the fact that these plans are of a most preliminary character, intended to show the use of the Marginal Way, and the results which can be obtained, rather than actual details of construction.

Respectfully submitted,

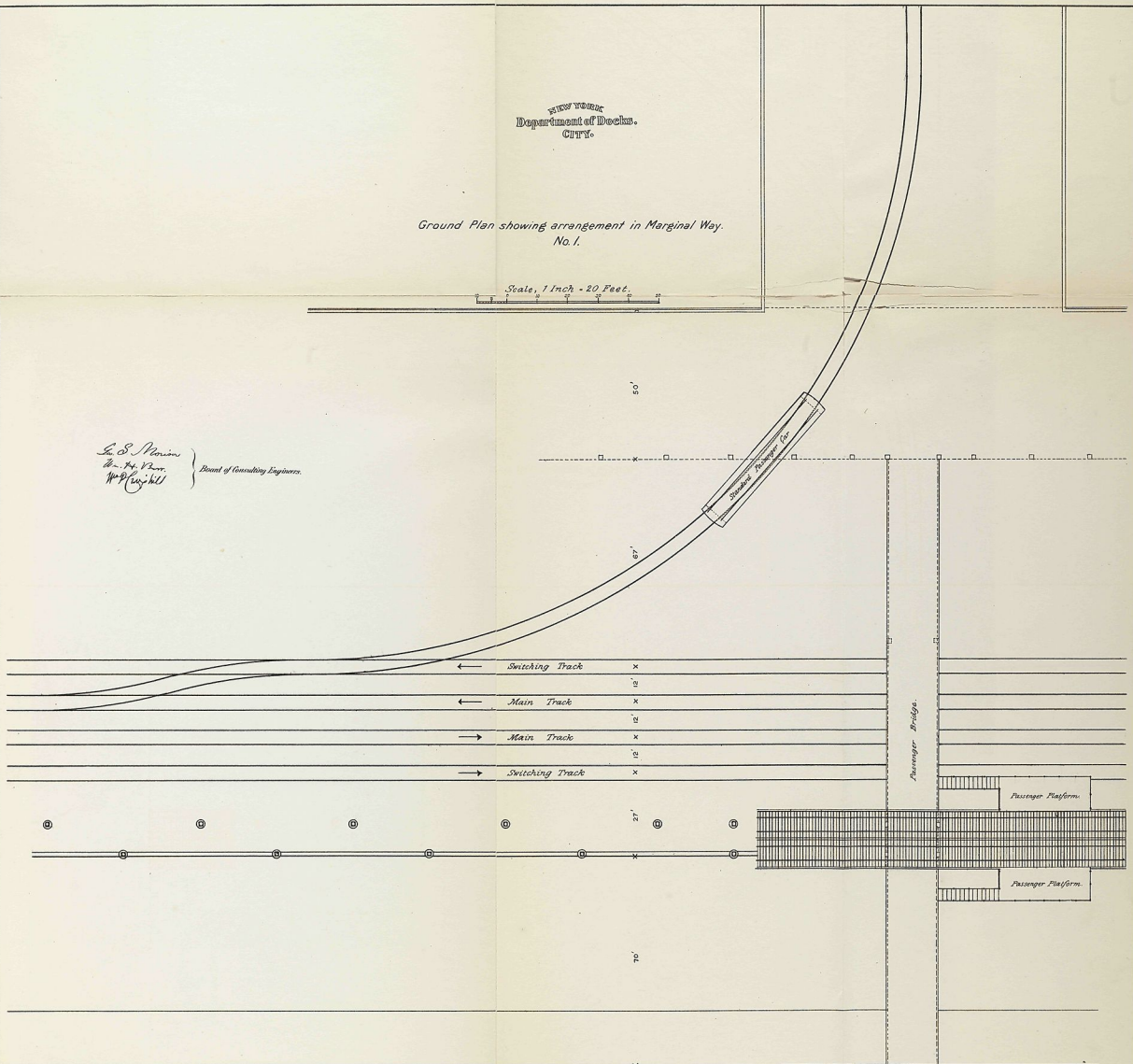
(Signed) GEO. S. MORISON.
 WM. H. BURR,
 WM. P. CRAIGHILL.

NEW YORK
Department of Docks.
CITY.

Ground Plan showing arrangement in Marginal Way.
No. 1.

Scale, 1 Inch = 20 Feet.

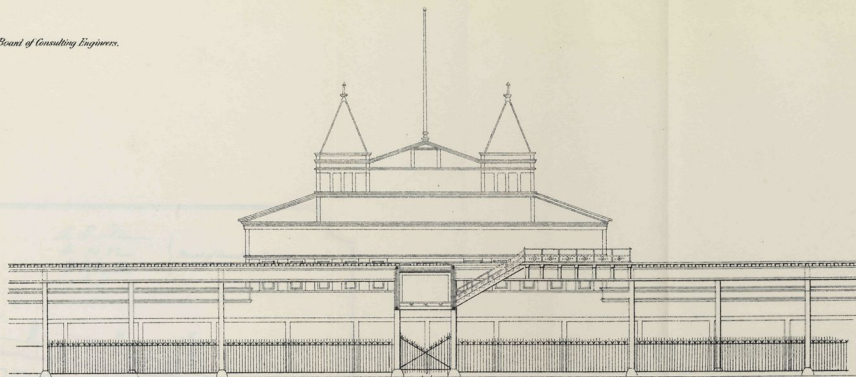
L. S. Plavin
Asst. Engr. New York
Harbor Engineering } *Board of Consulting Engineers.*



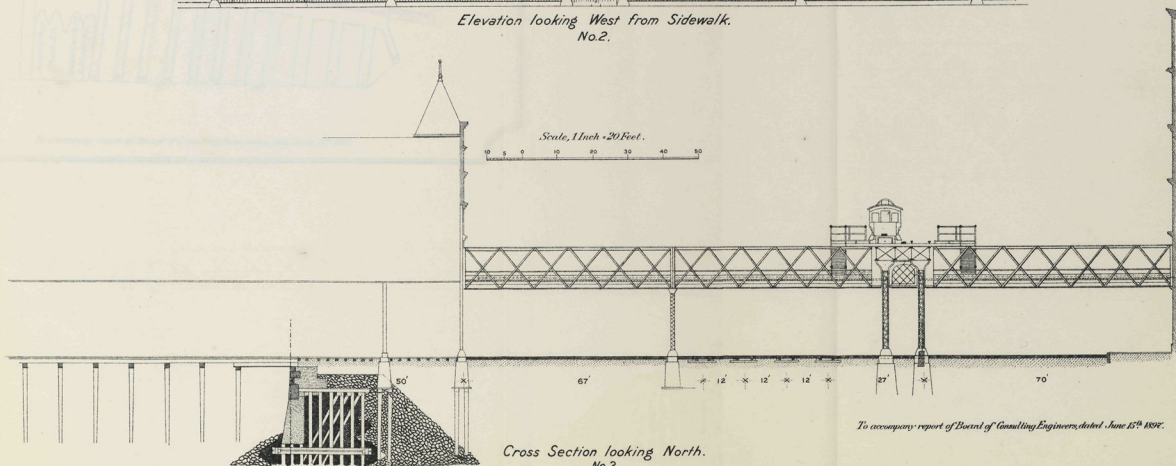
NEW YORK
Department of Docks.
CITY.

L. S. Minin
J. H. Vane
W. P. Smith

Board of Consulting Engineers.



Elevation looking West from Sidewalk.
No. 2.

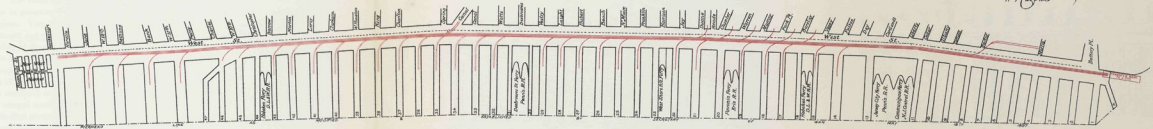


Cross Section looking North.
No. 3.

To accompany report of Board of Consulting Engineers, dated June 15th 1897.

NEW YORK
Department of Docks.
CITY.

E. S. Morin
B. H. Vane
H. P. Wright } Board of Consulting Engineers.



Plan showing tracks in Marginal Way.
No. 4.

Scale { 1 inch = 600 feet.
1 inch = 182.88 metres.



To accompany report of Board of Consulting Engineers, dated June 15th 1897.

To the Board of Docks:

Gentlemen.—Your Board, having been requested to consider the subject of the proper method of arranging the easterly fifty feet of an exterior street, 115 feet wide, extending from the center line of East Sixty-fourth street to the northerly line of East Eighty-first, has the honor to report as follows:

Chapter 697 of the Laws of 1887, as amended by the Laws of 1888 and 1889, lays upon the Board of Docks the duty of making plans for and constructing the easterly fifty feet of such an exterior street 115 feet wide, which exterior "street and the bulkhead forming its outer edge shall be and remain at all times a public exterior street or wharf for free and common use," consistently with other provisions of the statute. The East river is narrow throughout the length of this proposed improvement, and no piers or other structures are permitted east of the bulkhead line, which is to form the easterly limit of this exterior street. The tidal currents are very strong in this portion of the river, so that vessels are not conveniently berthed here. It is practically certain that these several conditions will prevent heavy vessels ever seeking berths in this vicinity. The shore of Manhattan Island along the portion of the East river under consideration is generally high, rocky and not well adapted to development for commercial purposes. Very little shipping of any kind has found accommodation between East Sixty-fourth and East Eighty-first streets.

The portion of the city in the vicinity of this part of the water-front is densely populated and is seriously deficient in park facilities. It has been suggested that the portion of the water-front under consideration might be so developed as to be available for purposes of recreation chiefly, possibly in connection with suitable facilities for such limited commerce as may need to be accommodated. Your Board has given this matter very careful consideration; its members have not only examined the water-front, but also that portion of the city lying immediately adjacent to it. Sixty-fifth, Sixty-sixth and Sixty-seventh streets are not yet open east of Avenue A, and the shore in this locality is very abrupt and from 30 to 40 feet high. The streets from Sixty-eighth to Eighty-first street, inclusive, are open, but landing facilities are generally confined to the stretch extending from East Seventy-third to East Eightieth street, and even within these limits not every street affords such facilities. The present commercial demands for this part of the water-front could all be accommodated reasonably well between the south side of Seventy-eighth street and the north side of Eightieth street. On this reach the shore is low enough to be easily adapted to commercial development; the remainder is abrupt, relatively high and ill adapted to use by shipping. The needs of this portion of the city are for local supplies, such as coal, lumber, brick, cement and other similar materials. The small landings now existing are almost entirely used for the accommodation of such classes of business.

The peculiar conditions under which this improvement is to be made may be briefly stated: 1st. The law under which the Board of Docks is required to make it is mandatory, the only discretion being in the location of the bulkhead wall which may be placed inside of the fifty feet line if it be thought expedient. 2d. The law apparently contemplates the use of this water-front for commercial purposes. 3d. Although small craft are berthed here at times the commercial demands are now light. 4th. If the bulkhead were built it would probably immediately become a place of resort for the population

residing in the neighborhood, and whatever its nominal purpose, would be used more for recreation than for commerce.

There appear to be three general methods which could be followed in the construction of this work under the law. The first would be to make the bulkhead wall of cheap timber crib construction, placing it sufficiently far back of the final location to allow the permanent work to be built in front of the temporary. This would meet the requirements of the law and be the cheapest solution of the case, but it would be a departure from the practice of the Department of Docks in permanent bulkhead construction, and your Board does not recommend it. The second would be to build a permanent masonry wall on the final location, making no excavation in front of such wall and founding it by some sub-aqueous method on concrete extending from mean low water to the rock. The third would be to build a masonry wall on the final location, and also to excavate the rock in front of this wall so as to give the desired depth for berthing vessels. This latter would be the complete and also the most expensive solution of the problem.

Your Board is inclined to the opinion that it would be most expedient to carry out the second plan, which involves the construction of the permanent wall but no deepening of the water. The small craft which now land cargoes in this neighborhood are of light draft, and are berthed where there is now a depth of from 10 to 12 feet below mean low water. The profile of the present bottom of the river on the established line of the bulkhead wall shows a depth exceeding 10 feet from the north line of Sixty-sixth street to the centre of Seventieth street, and a depth of 12 feet or more from the centre of Sixty-seventh street to the middle of the block between Sixty-ninth and Seventieth streets; it shows a depth of 10 feet or more from a point 50 feet north of Seventy-first street to the middle of the block between Seventy-third and Seventy-fourth streets; there is practically no available water between Seventy-fourth and Seventy-eighth streets, the occasional positions where the depth is considerable being too short for the safe berthing of vessels. There is a depth of 10 feet or more from the centre of Seventy-eighth street to the middle of the block between Eightieth and Eighty-first streets, except for a very short distance north of Seventy-ninth street, where a minimum depth of eight feet is found. A considerable portion of the wall could, therefore, be used at once by the same class of craft that now comes to this part of the city. Should it be found important to accommodate deeper vessels in this locality, it is entirely within the means now at disposal of engineers to excavate the rock in front of the bulkhead wall without disturbing the foundation of such wall.

As to the construction of the concrete foundation below mean low water, your Board believes that plans should be made on two different designs. In the first, the concrete would be laid in bags of sufficient size, to be placed without any moulds or sustaining forms. The second would involve the construction of closed timber forms of suitable size, shaped to fit the rock as closely as practicable, within which concrete would be deposited from large buckets controlled by proper appliances, the timber being left in place. Economical results could be obtained by either of these processes.

Before actual work is done, a very careful examination should be made of the whole line, and all quantities calculated. Such an examination has already been made of the portion between Seventy-sixth and Seventy-eighth streets, the examination here having in fact been extended to a degree of minuteness which would not be necessary unless deep water is to be obtained in front of the bulkhead wall. An estimate should be made for a permanent bulkhead wall of the kind described; but in estimating the cost of this bulk-

head wall the engineer should not be limited to the class of construction referred to, but should consider the use of coffer-dams in any locations where this method might be more economical.

Your Board is impressed with the belief that the adoption of the third plan, which involves not only the present construction of the permanent bulkhead wall, but the deepening of the water in front of this wall, would be premature, and is also of the opinion that this portion of the water front should be given such treatment in the matter of construction, as has been outlined, and that a permanent wall should be built on the bulkhead line. This will equally serve the purposes of commerce, if it should be found that it is necessary to develop it in that direction, or the purposes of recreation throughout any portion or the whole of its extent, if it shall be found that such a course is for the best interests of the city, and consistent with the law under which the Board of Docks must formulate its plans.

It is the judgment of this Board that all of this waterfront not needed for commercial uses should be devoted to purposes of recreation, and that the construction of the bulkhead should be designed with that end in view. It is further believed by your Board that the stretch of about 620 lineal feet of waterfront, extending from the south side of East Seventy-eighth street to the north side of East Eightieth street, will accommodate the needs of commerce for this vicinity, and leave the remainder of the front available for recreation. By this means a densely populated portion of the city, now seriously deficient in park facilities, would secure great relief without prejudice to the commercial interests of the waterfront.

Accompanying this report is a profile, showing the position of the rock bottom along the established bulkhead line in this locality.*

Respectfully submitted,

GEO. S. MORISON,
WM. H. BURR,
WM. P. CRAIGHILL.

OFFICE OF THE BOARD OF CONSULTING ENGINEERS, }
NEW YORK, October 21, 1897. }

To the Board of Docks:

Gentlemen.—In the report of April 30th, 1897, the Board of Consulting Engineers described the method in which it thought that the Marginal Way should be used to accomplish the best commercial results for the City of New York. This plan contemplated the practical narrowing of the Marginal Way to two hundred feet along the North River, by allowing sheds to be erected on the fifty feet adjoining the bulkhead wall, and the division of this remaining two hundred feet into four strips, namely: a strip of seventy feet wide adjoining the bulkhead line, which would form a street of the usual character; a strip twenty feet wide to be used for standing teams while loading and unloading cars; a strip fifty feet wide to be occupied by four railroad tracks; and a strip sixty feet wide to be used for the storage of freight in the open air and for approach to the adjoining railroad track. The street and the adjacent twenty feet strip might be separated by a substantial fence and it was proposed to put an elevated passenger railway over this strip. Drawings illustrating this arrangement along the North River were submitted with a brief description June 15th, 1897.

*Profile not printed.

Your Board is gratified in stating that the revision of plans for the North River waterfront recommended in that report has been made and that the two hundred and fifty feet Marginal Way will be maintained along the whole North River front.

In the same report the following statement was made: "On the East River a Marginal Way two hundred feet wide has been established, though not yet constructed, from the Battery to Corlears Hook. Above Corlears Hook the conditions are very irregular. Your Board believes that this two hundred feet Marginal Way along the East River is enough, provided no sheds are allowed along the bulkhead wall, but that any reduction in this width is inadvisable. The division of this two hundred feet would correspond precisely to the division of the two hundred and fifty feet on the North River, the bulkhead wall taking the place of the shed line allowed on the two hundred and fifty feet Way."

The question has now been raised whether a portion of the Marginal Way along the East River cannot be used for warehouse purposes. It follows as a matter of course that if any portion of this Way is to be devoted to warehouses, the established Way, being only two hundred feet wide, the use of that portion for the purposes contemplated in the report of April 30th must be abandoned. The one hundred and forty feet adjoining the building line and comprising the first three strips named above, is devoted to traffic in the direction of the street and to uses immediately connected with the same, this traffic being partly ordinary street traffic, partly railroad traffic with accompanying street traffic, and partly overhead passenger traffic. Your Board can see no method by which warehouses can be built on this portion of the Way without seriously interfering with the traffic to which this portion of the Way should be appropriated.

The case is different with the strip between the railroads and the bulkhead wall. This strip is devoted to the storage of goods in the open air and to access to the railroad tracks and the goods. If it is desired to substitute warehouse storage for this open air storage it would not seriously affect anything else. It would be possible to build a series of warehouses sixty feet wide along the bulkhead wall which could be used for storage, the lower story being so planned that it would not interfere with the approach by teams to the piers and to cars standing on the adjoining track, nor with the approach to the piers by railroad switches. This would somewhat complicate the design of the buildings, but the complication is of a character which could very easily be overcome.

Sixty feet, however, is rather a narrow strip and a warehouse built upon it would be expensive when its storage capacity is considered. Your Board will therefore call attention to the fact that the bulkhead line is straight from James Slip to Montgomery Street, and that adjoining the Marginal Way are a series of blocks varying from one hundred and forty to one hundred and sixty feet in width. These blocks are of good dimensions for warehouse purposes; they constitute an area of about ten acres, and, if ten story warehouses are built, they would furnish, on a basis of twenty square feet to the ton, storage for two hundred and eighteen thousand tons of merchandise, which capacity could be doubled by using the adjoining line of blocks. Access to these blocks could be maintained by overhead bridges of similar position to those proposed for passenger traffic along the North River, but which would be adapted to freight service. By a system of elevators on the piers, and of mechanical transmission, the receipt and delivery of goods to and from these warehouses could be made very easy. Furthermore, they could be used in connection with warehouses on the sixty feet strip, if any such are built, and bridges could be constructed on the level of every floor. The arrangements which could be devised for reaching these warehouses from the streets and the waterfront are so various that it does not seem expedient to enumerate them now.

Although your Board considers it of the utmost importance that the width of the Marginal Way should not be reduced below the established two hundred feet, and that the portion to be occupied by longitudinal traffic should be maintained one hundred and forty feet wide, with provisions for approaches in the adjoining sixty feet, it does not necessarily follow that this Way should be immediately adjacent to the bulkhead wall. On the North River, where the established width of the Way is two hundred and fifty feet, your Board has recommended that the fifty feet along the bulkhead wall should everywhere be occupied by sheds; the width of these sheds was fixed at fifty feet, because it was considered important to retain the remaining two hundred feet for the purposes specified in the earlier reports. Had the Way been three hundred feet wide there would have been no objection to occupying one hundred feet by sheds, and to expanding the uses of these sheds into something like complete warehouses. It is only the natural development of this idea to say that where there is a special demand for warehouses adjoining the piers, such warehouses may be permitted immediately along the bulkhead wall, provided the proper width for a marginal street can be reserved back of these warehouses. In other words, the principal object of the Marginal Way is access to the various interests along the waterfront. Where these interests are of a nature which generally exists along the North River, namely, regular transportation lines which deliver passengers and goods to be quickly taken away with comparatively little storage, the Way should be near the bulkhead. Where the business is principally of a storage character the stores may be most conveniently located between the piers at which the steamers land and the Way on which the goods are finally taken off.

Where there is any large amount of business across the river, such as frequent ferries, there are objections to placing the Marginal Way back from the bulkhead, but if localities can be found in which there are no demands for reaching the river bank there would be no such objection. On the portion of the river just named, between Catharine Ferry and Corlears Park, there would seem to be no objection to throwing the Marginal Way back as far as Cherry street, leaving the blocks between Cherry and South streets for warehouse purposes, provided a proper connection could be made with float landings near the foot of Jackson street, as proposed in the report of April 30th.

From Jackson street to the Recreation Pier at the foot of East Third street the front is occupied by the New Corlears Park, by several ferries, and enough other incidental uses to preclude its use as a warehouse district; but from Third street to Twenty-third street no such condition exists, and if a continuous way at least one hundred and forty feet wide could be provided at a distance of a thousand feet or more from the authorized pierhead line, an excellent warehouse district could be created here. Such an arrangement could only be brought about by united action on the part of property holders and an agreement with the city. In a general way it may be said, however, that if the property owners would give the city a clear strip one hundred and forty feet wide from East Third street to East Twenty-third street, at a convenient distance back from the waterfront, it might be expedient to allow these property owners to occupy everything, including streets, between this new way and the water, and to build piers and warehouses of such character as they desire, subject only to the usual rules which must always govern the character of construction within the city. In making any such arrangement, the city's ownership of property east of the proposed new street or way should, of course, be taken into consideration, and at least one East and West street should be kept open to the river within these limits.

From Third street to Eighth street, the new way could be made an enlargement of Lewis street, or preferably it could be made an enlargement of Avenue D from East Third street to East Thirteenth street. If the way were located on Avenue D, and the bulkhead were built five hundred feet back of the established pierhead line, thus giving room for piers five hundred feet long, the area available for warehouses between the bulkhead line and such new way would be about fifty acres, while at least as much more could be obtained between Fourteenth street and Twenty-third street. Above Thirteenth street, it would be necessary to open an entirely new way. From Twenty-third street to Thirty-fourth street, it would probably be expedient to adhere to the established Marginal Way, and there would be no room for warehouses.

In our report of April 30th, 1897, the following statement will be found: "Above Thirty-fourth street the general character of the bank is fatal to such a scheme [Marginal Way]; the Board does not mean that it could not be built, but the objections and difficulties of construction exceed any advantages which are likely to accrue. If any railroad line is to be built near the east water front it is believed that the best route to follow would be down First avenue, the line being partly in tunnel and partly elevated." Your Board would call attention to the fact that if it is desirable to connect the railroad tracks on the way above Third street with those which would be laid below Corlears Park, a feasible route can be found by following Lewis street or Columbia street to Grand street, and going through some private property, following Jackson street to the Marginal Way. On this route the two through tracks should be depressed below the surface, the ascent to the surface being made at one end south of Henry street and at the other north of Third street where the continuation of the streets toward the river would be abandoned. These possibilities show that a line of freight railroad could, without insuperable difficulties, be built on the East Side from the Harlem river to the Battery.

Respectfully submitted,

(Signed) GEO. S. MORISON,
 WM. H. BURR,
 WM. P. CRAIGHILL.

To the Board of Docks:

Gentlemen.—In its last report, dated October 21, 1897, the Board of Consulting Engineers outlined a general arrangement under which the Marginal Way might be placed back from the bulkhead along a portion of the East river, so as to provide a space for warehouses between such Way and the piers. In this report, the Board stated as follows:

“In a general way it may be said, however, that if the property owners would give the city a clear strip one hundred and forty feet wide from East Third street to East Twenty-third street, at a convenient distance back from the water front, it might be expedient to allow these property owners to occupy everything, including streets, between this new Way and the water, and to build piers and warehouses of such character as they desire, subject only to the usual rules which must always govern the character of construction within the city. In making any such arrangement, the city's ownership of property east of the proposed new street or Way should, of course, be taken into consideration, and at least one east and west street should be kept open to the river within these limits.

This Board now submits a map showing a possible arrangement to accomplish this result, but wishes to state distinctly that while this is a possible, it is by no means the only possible arrangement. Your Board thinks that, especially above Eighth street, circumstances might arise which would lead to very important changes.

On this map the arrangement of the Marginal Way below Corlears Hook Park remains unchanged, and four railroad tracks are shown upon it in the position which has been proposed in the earlier reports of this Board. The two middle tracks are carried along Jackson street, passing below the surface of Cherry street, and closing Front and Water streets, both of which streets, since the opening of the park, terminate at Jackson street. These two tracks continue below the surface in a subway under Jackson and Cannon streets to Houston street, and thence across a block to the intersection of Lewis and Third streets. This portion of the line would be in a tunnel or subway, a part of which could be built without disturbing the surface, but the greater part of which should be made in a manner similar to that now proposed for the Rapid Transit Subway. After passing Third street, the tracks would rise with a comparatively heavy grade to the surface, this portion of the line being an open cutting.

North of Third street, a street one hundred and forty feet wide, following the line of Lewis street as far as Eighth street and the line of Avenue D above Tenth street, is substituted for the Marginal Way along the bulkhead. The four railroad tracks are laid along the east line of this one hundred and forty feet street, it being premised that switches and other means of using the east track should be provided on the adjoining land. Connections could be made with the through tracks north of Sixth street after these reach the elevation of the street. The land between the bulkhead and the tracks is available for warehouses. A profile of the depressed track is also shown on the same street.

On this map, an arbitrary bulkhead line is shown five hundred feet back of the established pierhead line, and a series of piers five hundred feet long from Third to Twenty-third streets. On the same sheet is given a map showing both the existing and the suggested arrangements. Your Board is not satisfied that this bulkhead line is the one which it would be wise to adopt, but it is put on the map to show what facilities

can be furnished along this portion of the East river, with piers large enough to accommodate all classes of ocean steamers, except those belonging to the principal regular trans-Atlantic lines, and what room would be left for warehouses, without forcing the present pierhead line farther out into the river.

Your Board desires particularly to say that the only portion of this line which it feels is necessarily where business interests would place it, is that south of Eighth street. Conditions may readily arise in which it may be expedient to throw the Way further west at least as far as Twenty-third street, thus providing additional opportunities for warehouses along that section of the river.

Very respectfully,

GEO. S. MORISON,

WM. H. BURR,

WM. P. CRAIGHILL.

L. B. Martin
 Jr. H. B. Wright
 Board of Consulting Engineers

Scale 300 ft. = 1 in.

E. S. Mason
Rev. H. Vane
Wm. P. Fyfe

Board of Consulting Engineers

Scale 300 ft. = 1 in..

To accompany report of Board of Consulting Engineers, dated June 15th 1894.

THE NEW YORK CENTRAL AND HUDSON
RIVER RAILROAD COMPANY.

WEST SIDE TRACKS, CITY OF NEW YORK.

1. LETTER, W. H. NEWMAN to A. E. ORR, dated June 11, 1906.
2. REPORT OF GEORGE S. RICE, Chief Engineer of Rapid Transit Board.
3. LETTER, W. H. NEWMAN to A. E. ORR, dated January 7, 1907.
4. LETTER, GEORGE B. McCLELLAN, Mayor, to W. H. NEWMAN, dated February 19, 1907.
5. LETTER, W. H. NEWMAN to GEORGE B. McCLELLAN, Mayor, dated February 20, 1907.
6. REPORT OF SPECIAL COMMITTEE OF THE BOARD OF RAPID TRANSIT RAIL-
ROAD COMMISSIONERS.

NEW YORK CENTRAL AND HUDSON RIVER RAILROAD COMPANY.

W. H. NEWMAN, President.

GRAND CENTRAL STATION,
NEW YORK, June 11, 1906.

HON. ALEXANDER E. ORR,

President, Board of Rapid Transit Commissioners of the City of New York,
320 Broadway, New York City.

DEAR SIR:

Chapter 109 of the Laws of 1906, entitled "An Act to terminate the use of streets, avenues and public places in the City of New York, in the Borough of Manhattan, by railroads operated by steam locomotive power at grade," became a law March 26, 1906.

While much of the language of this statute is general in form, it was drawn, introduced and passed for the specific purpose of causing the tracks of this Company south of 59th street in Eleventh and Tenth Avenues and other streets to be placed in a subway. With the general purpose of the bill as expressed in its title this Company is in hearty accord, as evidenced by the fact that it has been making agreements with the City of New York for several years last past having for their purpose the elimination of the use of streets and avenues at grade, and has expended, and is now expending, large sums of money in carrying out these agreements.

This Company, however, felt it to be its duty to oppose the enactment into law of the bill as introduced, and it appeared, by its General Counsel, before the Committees of the Legislature, the Mayor and the Governor, giving its reasons for such opposition.

In brief, it opposed the passage of the bill in the form in which it has become a law, on the grounds that many of its provisions were of at least doubtful validity; and that the one remedy proposed is, for operating and traffic reasons, not practicable, or, if not wholly impracticable, would result in great injury to the Railroad Company and its shippers who have located upon its line. It was contended by the Railroad Company that if either the one remedy to which, under the bill which has become a statute, your consideration must be directed is not practicable, or if the bill or any of its material provisions is invalid, the statute would necessarily be ineffectual, and that the object sought could not be attained under it. That this would be the result if the remedy is impracticable is apparent; and it would be none the less true if the statute is not a valid law, for the City, on the one hand, could not enter into a binding contract under such a statute, and on the other hand the Railroad Company could not enter into such a contract, under which the expenditure of large sums of money must necessarily be involved. For these reasons the acceptance of a bill which would be free from these objections was urged on behalf of this Company.

That there was force in these contentions, or some of them, was practically admitted by many of those who had occasion to act officially upon the bill. The Chairman of the Committee on Affairs of Cities in the Senate, in reporting the bill, said:

"This bill was framed to meet a public emergency. But it is a very radical bill. On account of its drastic terms I fear it will lead to endless litigation. This will delay the improvement that is so much needed. Also, I believe that

in passing this bill we are establishing a dangerous precedent—that the Legislature should arbitrarily determine how a great piece of engineering work must be done. We have not sufficient competent engineering knowledge to be able to determine such a purely technical question. However, it seemed to be impossible to amend the bill, and I shall not oppose it.”

The Mayor of the City of New York, in accepting the bill, filed a memorandum, of which the following is a copy:

“Memorandum to accompany Assembly bill No. 236, Int. 236, entitled: ‘An Act to terminate the use of streets, avenues and public places in the City of New York, in the Borough of Manhattan, by railroads operated by steam locomotive power at grade.’

“There is no question in my mind that some legislation is desirable in order to terminate the use of the public streets by steam railroads operating at grade in the Borough of Manhattan. While many of the provisions of the proposed bill are open to criticism, and while there are some doubts as to whether its enactment will accomplish the object which is sought, I consider that it is a step in the right direction, and therefore have no hesitation in accepting it on behalf of the City of New York.

“It has been suggested that in case the bill proves to be defective in certain provisions it will be possible to seek relief next year from the Legislature and have the act amended so that it may finally prove to be effective. I see no reason, however, why the proponents of the bill should wait a year before attempting to correct such defects as the bill may contain. It seems to me that it would be more advisable, after a careful consideration of the objections that have been urged against the bill, to propose amendments and present them to the present Legislature, in order that the City may obtain without delay a statute of sounder constitutionality and more certain effectiveness.”

A few days after the bill became a law we learned through the newspapers that it had been called to the attention of your Board by its counsel, Mr. George L. Rives. Thereupon, the General Counsel of this Company, Mr. Ira A. Place, called upon Mr. Rives and stated to him that, notwithstanding the objections to the form of the bill, the attitude of the Company and of its officers would be to at all times facilitate the work of your Board in carrying out the duties imposed upon it by this act.

Since that time, I understand that the Chief Engineer of your Board, Mr. George S. Rice, has had a conference with Mr. William J. Wilgus, our Vice-President, on the subject, and has asked for certain information which has been furnished, and that Mr. Rice and Mr. Wilgus have each appointed a representative to confer in regard to details.

What, if any, progress has been made under the statute in question, except as outlined above, I am not advised, and I am writing this letter to assure you officially of the position of the Company in the matter, and to confirm the statement of Mr. Place in regard thereto. It is a matter of much importance, not only to the Company, but to the City and to its transportation interests, and the Company desires that nothing shall be left undone which its officers can do to facilitate the right solution of all the questions involved. As indicated in the interview with Mr. Rives, heretofore mentioned, the Company does not waive any of its rights, and particularly it does not waive its right to at any time question the validity of the statute or of any act done or sought to be done under it. The statute undoubtedly imposes upon your Board the duty of making such investigation of the situation as will enable it to determine

what ought to be done, and if it is then found that additional legislation is required such legislation can be intelligently considered.

Assuring you that we stand ready to co-operate with your Board in its investigations, I am,

Yours respectfully,

W. H. NEWMAN,
President.

THE BOARD OF RAPID TRANSIT RAILROAD COMMISSIONERS.

GEORGE S. RICE,
Chief Engineer.

CHIEF ENGINEER'S OFFICE,
320 Broadway.

NEW YORK, November 14, 1906.

The Honorable A. E. ORR,
President Rapid Transit Board.

DEAR SIR:

In accordance with a statute passed by the last legislature of the State of New York, which became a law on March 26, 1906, being Chapter 109 of the Laws of 1906, entitled:

‘AN ACT to terminate the use of Streets, Avenues and public places in the City of New York, in the Borough of Manhattan, by railroads operated by steam locomotive power at grade,’

and pursuant to the consequent order by the Board, I have made a thorough investigation of the above-mentioned subject and have had careful surveys and borings made. These preliminary inquiries were essential to a complete understanding of the subject, and have necessarily consumed much time. I now beg to report as follows:

I find that the only railroad tracks to which the Act applies are those located on the west side of the Borough of Manhattan belonging to the New York Central & Hudson River Railroad Company. There are other tracks belonging to other companies which are operated by steam locomotive power at grade, but according to paragraph 8 of the Act, the law does not “affect or apply in any way to a corporation operating a steam surface railroad in the City of New York for the purpose only of transporting freight from its wharves, docks or piers to its freight yards or depots in said City over tracks not more than one-half mile in length.”

From information derived from the officers of the Railroad Company, it appears that the tracks of the New York Central & Hudson River Railroad on the west side of the Borough of Manhattan are located—beginning at Spuyten Duyvil Creek and going south to 72nd Street—on their own right-of-way; except at the points where these tracks cross intersecting streets, and on 12th Avenue between 141st Street and 135th Street, where title has been acquired by the City. The tracks cross at grade the following streets, which have been regulated, graded and paved, and are now in use, viz.:

Dyckman Street; Depot Road (177th Street); 165th Street; 158th Street; 155th Street; 151st Street; 145th Street; Manhattan Valley (129th to 138th Street, inclusive); 96th Street, 79th Street.

From 72nd Street to 61st Street the tracks are on the right-of-way of the Company; from 61st Street to 33rd Street, the tracks are on the surface of Eleventh Avenue; from 33rd Street, they are on the Company's own right-of-way, and the main tracks run diagonally across the blocks between 33rd and 30th Streets to Tenth Avenue, crossing 32nd and 31st Streets at grade. From 30th Street to Bloomfield Street, the tracks are on the surface of Tenth Avenue; and from Bloomfield Street to Canal Street, the tracks are on the surface of West Street. Here they turn east on Canal Street to the intersection with Hudson Street, where they turn south on Hudson Street and run into the yard at St. John's Park.

From 72nd Street to 59th Street, all the space between the main tracks and the river is occupied by a railroad yard, the intersecting cross streets for this distance having been closed by act of the legislature.

Between 37th and 30th Streets the Company has an extensive yard, 33rd Street and 32nd Street being occupied by railroad tracks between Eleventh Avenue and the river front, and 31st Street being occupied by railroad tracks between Tenth Avenue and the river front.

The Act contemplates an agreement with the Railroad Company, which shall provide for the construction by the Company, at its own cost, of a subway either under the roadbed of the present or under other streets to which the tracks shall be removed. As a condition of the agreement, "all present franchises of every kind on, across, through and along such streets" are to be surrendered and the tracks removed therefrom at the cost of the Railroad Company. The Act therefore looks only to the construction of subways in lieu of the present surface tracks.

Nevertheless, I think that from 72nd Street to Spuyten Duyvil Creek, assuming that the railroad here is on its own right-of-way, it would be a far more practicable method of dealing with the subject to have the tracks remain at the present elevation, except at the crossing of Manhattan Valley between 129th and 138th Streets, where I should propose to elevate the tracks. At the other street crossings of this portion of the route, I should propose to elevate the streets and have the same cross above the railroad tracks, and from the west side of the railroad each street would go down on an incline parallel to the railroad until it reached the level of the wharves or piers along the river front. The above seems to be the most practical mode of avoiding any grade crossing of streets and railroad tracks for this portion of the route, although it will require an amendment to the Act; but such amendment would not appear to be inconsistent with the main purpose of the Legislature.

Subways at these crossings could be built, but the expense would be very great, and it does not seem to be a desirable thing to do, as the main object of the Act can be obtained at a much lower expense.

I submit herewith a plan showing the manner in which it is recommended that the street crossings north of 59th Street should be dealt with. If it is thought necessary to have plans for subways under the cross streets on this part of the route, such plans can be readily prepared.

I have been in consultation with the Engineers of the New York Central & Hudson River Railroad in regard to the problem of removing the New York Central tracks from the surface of the longitudinal streets of the route. They have expressed their opinion that the best solution would be to build an elevated structure from 59th Street, south, along the River front to Franklin Street, the lower four blocks between West Street, Washington Street, Lighthouse Street and Franklin Street being

occupied by an elevated railroad yard. The reason for this preference is obvious, as besides being cheaper to build, such a road would offer opportunities for convenient connections to the river piers, involving better facilities for taking care of the river traffic than any other way.

Mr. William Barclay Parsons recommended an elevated railroad along the river front in his report to the Rapid Transit Board dated February 19, 1903.

As, however, the question of an elevated railroad cannot be considered under this Act, I have, after consulting with the New York Central engineers, prepared plans for a subway to take the place of the present New York Central tracks, now operating on the surface of the streets south of 59th Street.

Herewith are submitted two sets of plans for a subway following two different routes, namely:

Alternative—1. Lay-out following approximately the same avenues and streets as the present tracks of the New York Central until the intersection of Canal Street and West Street, and from Canal Street, instead of going east on Canal Street, continuing down West Street to Franklin Street.

Alternative—2. Beginning at about 64th Street, crossing the present railroad yard, in a southwesterly direction to 12th Avenue and along 12th and 13th Avenues and Marginal Street and West Street to Franklin Street.

Alternative 1 is to my mind preferable to Alternative 2 on account of the lower cost of construction. The New York Central officials, however, have expressed the opinion that if a subway is to be built at all a line along the river front would be preferable, but I have not yet received a final statement from them to that effect.

The yard at 30th Street, for both alternatives, is located upon the plans in such a way that one would enter the part of the yard used for freight from the subway on Eleventh Avenue. The freight yard on the east side of Eleventh Avenue would be entirely underground and connect with the surface by elevators. The freight yard on the west side of Eleventh Avenue would come to the surface at Twelfth Avenue, where there would be easy access to the same for teams from the street. On the plans I have shown 31st and 32nd Streets closed for street traffic between Eleventh and Twelfth Avenues, as also is the case now. To connect with the river piers, it will be necessary to cross Twelfth Avenue on grade from this yard.

At other places where a connection with a pier is desired, private property will have to be acquired for the construction of inclined tracks for the purpose of coming up from the subway tracks to the surface at the level of the piers, it being necessary here also to cross the street along the river front at grade.

In considering the practical working of a subway railroad in connection with the piers along the Hudson River, it is to be observed that in every case, except at the railroad yard near 30th Street, the number of cars that can be operated in connection with any one pier must necessarily be governed by the length of the tracks located upon private property acquired for this purpose. The best method of getting up from the grade of the subway to the surface of the piers would be by a switch curving easterly into private property, and there forming a Y with a track leading westerly back towards the pier and over the surface of the subway and upon the surface of the street.

In the lower part of the City, south of Bloomfield Street, the blocks at right angles to the river are about 360 feet in length or less. With this length at our dis-

posal, it would not be practicable to operate more than two cars at a time in connection with the piers, which, of course, would be slow and expensive.

Connections with private enterprises along the road would be by a subway siding from the main line, and in many cases it would be necessary to acquire private property for this purpose. To connect such a subway siding with the surface, elevators would have to be used.

On the plans I have shown the southern terminus of the railroad between West Street, Washington Street, Laight Street and Franklin Street, instead of at St. John's Park, thereby avoiding the complications involved in crossing the contemplated new Rapid Transit Subways on Washington Street, Hudson Street and Desbrosses Street. The private property necessary to construct the new yard will have to be acquired.

At 53rd Street the New York Central officials wish to construct a two-track spur running east to connect with the Grand Central yard where 53rd Street runs into the same, and operate this spur and the part of the line along the river front north of 53rd Street partially as a passenger railroad. This would greatly increase the efficiency of the New York Central in handling its suburban traffic.

It may be doubtful whether such a subway could be constructed under the terms of Chapter 109 of the Laws of 1906, but it could certainly be constructed under the provisions of Section 32 of the Rapid Transit Act. I have indicated in the accompanying plans the beginning of such a subway at the northern and western end thereof. The detailed plans for such a road, if approved by the Board, could readily be prepared.

Having in view the possibility of a crosstown subway at 53rd Street, the main line of both alternatives for the road south of 59th Street is laid out in the accompanying plans as a four-track structure down to 53rd Street and a two-track structure south of this street. In connection with the Main Line, I have laid out a number of sidings and connections to yards and to piers opposite the yard at 30th Street. I have, however, not shown all the connections to the different piers and private enterprises along the line except in the form of typical designs.

The cost of construction for both alternatives including yards and connections to same, as shown on the accompanying plans, is estimated as follows:

For Alternative—1.....	\$29,700,000
For Alternative—2.....	33,150,000
For reconstruction of present connections to river piers and private enterprises.....	850,000

This does not include the cost of private property which it is necessary to acquire.

In evolving either one of these projects, it may be found advisable to add tracks to facilitate operation in many places, and this would add to my estimate of the cost as given above.

As I have already stated, I have been in consultation with the engineers of the New York Central & Hudson River Railroad Company, but they are not yet ready to give any definite statement about their views in regard to the question of substituting a subway for their present tracks. This has caused some delay in preparing my plans because I have wished, as far as possible, before I submitted them, to be acquainted with the views of the New York Central officials on the matter. Within

a short time it is expected that we may receive a communication from them embodying their views fully on this subject.

Respectfully yours,

GEORGE S. RICE,
Chief Engineer.

NEW YORK CENTRAL & HUDSON RIVER R. R. CO.

W. H. NEWMAN,
President.

GRAND CENTRAL STATION,
NEW YORK, January 7, 1907.

HON. ALEXANDER E. ORR,
President, Board of Rapid Transit Railroad Commissioners,
320 Broadway, New York City.

DEAR SIR:

A copy of the report of your Chief Engineer on the result of his investigations made under the provisions of Chapter 109 of the laws of 1906, dated November 14, 1906, was duly received from the Secretary of your Board. The report deals with the tracks of this Company on the westerly side of the Borough of Manhattan.

Since its receipt the report has had our earnest consideration. The facts in respect to existing conditions as stated by Mr. Rice are so nearly accurate that time will not now be taken to rehearse them.

The method of treatment suggested by your Chief Engineer north of 60th Street is well considered and, we think, is entirely practicable. Its details must necessarily be subjects of discussion with your Board.

South of 60th Street your Chief Engineer has in his report confined himself to the requirements of the act, which provides for a subway as the only method to be adopted. The officers of the Railroad Company have at all times believed that, as between an elevated structure and a subway, the real interests of both the public and of the Company would be much better served by placing the tracks on an elevated structure. The officers of the Company have, however, given careful consideration to the subway plan, and to the methods by which traffic must be handled under such plan. For an elevated structure it would seem that all the advantages are in favor of a route along the marginal street—that is, Twelfth and Thirteenth Avenues and West Street. For a subway the route described by Mr. Rice as "Alternative—1," with some modifications, is thought preferable. That route follows approximately the avenues and streets in which the tracks are at present to the intersection of Canal and West Streets, and from Canal Street, instead of going east on Canal Street, continues down West Street to Franklin Street. This might be modified so that the subway, if constructed, instead of following the present route of the tracks in Tenth Avenue, should continue in Eleventh Avenue from 30th Street to Thirteenth Avenue, and thence down West Street.

We wish now to submit to your Board certain reasons for our conclusions. These may be briefly stated as follows:

- (1) An elevated structure affords opportunity for more practicable and convenient connections with and access to warehouses, industries and piers. With many warehouses and industries, connections from a subway would be either impos-

sible or so difficult and expensive as to make them impracticable; connections from a subway with piers would not only be difficult, but, as stated by Mr. Rice, must necessarily be made at the grade of the marginal street.

- (2) An elevated structure affords opportunity for more practicable and convenient connections with the Company's own terminals and yards.
- (3) An elevated structure insures comparative freedom from danger of interruption and congestion of traffic from causes which are likely to happen in the case of a subway, such as broken water mains, leaks and similar difficulties.
- (4) An elevated structure may be built in much less time than a subway, and so afford much earlier relief. An elevated on the marginal street could also be constructed with much less interference with both railroad and street traffic.
- (5) The construction of an elevated will not interfere in any manner with the existing City sewer system, or with possible future subways which the City may desire to construct.
- (6) The operation of freight trains on an elevated structure will be safer and more efficient by reason of the open vision for communication of signals between enginemen and switchmen.
- (7) An elevated will require less investment on construction account, lower fixed charges, lower cost of maintenance and of operation, and therefore less burden on traffic. The expenditure in either case will necessarily be large. Mr. Rice's estimate of the entire improvement is about \$30,000,000. This does not include the cost of private property and other facilities which would be necessary to make a subway plan practicable.

We are not unmindful of the objections which have been urged against additional elevated railroad structures. There is no indisposition on our part to give due force to these objections, but it is submitted that many of the objections which are urged to the erection of such structures in other streets and avenues of the City do not have force with respect to the marginal street. This street is along the water-front, adjacent to warehouses, industries and water-front facilities, where an elevated structure would be a benefit rather than a detriment.

Your Chief Engineer pointed out some of the objections to a subway in his report. He mentions the fact that Mr. William Barclay Parsons, so late as 1903 (then being Chief Engineer of your Board), reported in favor of an elevated railroad along the river front. Your attention is also called to the fact that from 1895 to 1897 the Board of Consulting Engineers of the Dock Department of the City in various reports went so far as to advocate the construction of a four-track railroad on the surface of West Street for supplementing the congested water-front facilities and for the purpose of obviating the expanding use of bulkheads and piers by railroads to the exclusion of shipping interests. Point was given to the importance of this question and to its right solution in the report made to the Chamber of Commerce on the 3rd instant by its Committee on Foreign Commerce. The proper utilization of the water front, interchange of freight between water carrier and land carrier, and the interchange of freight between water carrier and land carrier and warehouse are all here involved. Not only is the available water front on the island so limited that neither a carrier by land or by water can secure all of the facilities required, but the traffic on the North River to and from this water front is becoming very heavy, and if its present increase continues it is certain that it will become so congested as to be

a menace to the safety of river traffic. It seems aparent that every carload of freight which could be delivered from an elevated track directly to pier or steamer would, to that extent, relieve congestion, both on the lower levels of the pier and in the slips.

The best method of terminating the use of the streets and avenues by the railroad at grade should be adopted. By this is meant the method which will best subserve the entire commercial and transportation interests of the City. That method will best enable the Railroad Company to serve the public. For the reasons here stated and for those given by Mr. Rice, the Company urges that your Board should now consider this question upon its merits. The general question as between an elevated and subway, or part elevated and part subway, it would seem, should first be decided. If the method which your Board determines to be best is not authorized by the act above referred to, it would not seem unreasonable to suppose that appropriate legislation might be had. It is evident that, in any event, additional legislation will be required.

Consideration of the West Side problem has suggested other subjects which appear to warrant investigation by your Board, one of which is a proposed low-level cross-town passenger subway connecting the Grand Central Station with the West Side. This will greatly relieve the present and growing congestion in the four-track Park Avenue tunnel route.

In the course of our investigations we have collected considerable information in respect to the present method of handling rail and water traffic, the annual tonnage, both water and rail, and the gross receipts from the West Side freight terminals of this Company, and also that which relates specially to the rail situation. We have also gathered some information in respect to the principal shipping districts of lower Manhattan in relation to the rail situation. This will be at the service of the members of your Board, if you desire it, and the officers of the Company will be ready at all times to give you such information and assistance as is in their power.

Yours respectfully,

W. H. NEWMAN,
President.

Upon receipt of the foregoing letter, the Board of Rapid Transit Commissioners appointed a committee consisting of the Mayor, Mr. Jesup and Mr. Smith to consider the subject with the representatives of the Railroad Company. After various conferences upon which a plan was substantially agreed upon, the Mayor addressed a letter, of which the following is a copy, to the Railroad Company:

CITY OF NEW YORK.
OFFICE OF THE MAYOR.

February 19th, 1907.

MR. W. H. NEWMAN,

President, New York Central & Hudson River Railroad Co., New York City.

SIR:

Referring to the recent discussions between yourself and other representatives of the Railroad Company on the one hand, and representatives of the City on the other, I beg to state that the general features of the plan agreed upon seem to be satisfactory and fair to the City.

Before laying before the Legislature a bill to enable this plan to be carried into effect, I must ask you to give me positive assurance that, in case a measure shall be enacted, your Company will be prepared, without delay, to take the necessary steps to initiate the proceedings contemplated, and that as soon as authority be given by the City, your Company will proceed with the execution of all the work contemplated.

Respectfully,

GEO. B. MCCLELLAN,

Mayor.

The following is a copy of the Railroad Company's reply:

NEW YORK CENTRAL & HUDSON RIVER R. R. CO.

W. H. NEWMAN,
President.

GRAND CENTRAL STATION,
NEW YORK, February 20, 1907.

Hon. GEO. B. MCCLELLAN,
Mayor,
City Hall, New York City.

DEAR SIR:

I acknowledge receipt of your favor of the 19th inst. stating that the general features of the plan agreed upon in the recent discussion between the representatives of the Railroad Company on the one hand, and the representatives of the City on the other, in regard to proposed change to be made in the railroad of this Company on the West Side of the Borough of Manhattan, seem to be satisfactory and fair to the City.

In view of the attitude of the City authorities, as we understand it as a result of these discussions, in response to the reasons in favor of an elevated structure, urged in our letter of January 7th, 1907, to the President of the Board of Rapid Transit Commissioners, we have felt compelled to yield to the position of the City authorities in respect to a subway between 30th Street and 60th Street yard.

In response to your request for an assurance as to the attitude of this Company, I beg to say that if a bill substantially in the form which has been agreed upon in these discussions shall become a law, this Company will be prepared without delay to take the necessary steps to initiate the proceedings contemplated, and that as soon as an agreement is reached in regard to details and authority is given by the City to carry such plans into effect, this Company will proceed with the execution of all the work contemplated and will use its best endeavors to complete such work within the shortest time practicable.

Very respectfully yours,

W. H. NEWMAN,
President, N. Y. C. & H. R. R. R. Co.

The following is a copy of the report of the committee of the Board of Rapid Transit Railroad Commissioners:

To the Board of Rapid Transit Railroad Commissioners:

The undersigned members of the Special Committee to which was referred the communication received from the President of the New York Central & Hudson River

Railroad Company, dated January 7, 1907, on the subject of the removal of the west side tracks of that Railroad from the surface of the streets, do now report as follows:

Mr. Jesup (much to the regret of the undersigned) has been prevented by illness from taking any part in the work of your Committee.

Your Committee by its representatives has had a number of conferences with the representatives of the Railroad Company in which the whole subject of the west side tracks in the Borough of Manhattan has been minutely discussed. As the result of these conferences a plan has been tentatively agreed upon, as follows:

The Railroad Company agrees to build a subway, at its own expense, from its present freight yard at or about 30th Street and Eleventh Avenue, up Eleventh Avenue to a point where it will join the present track system between 61st and 67th Streets and Twelfth Avenue. The subway is to be of sufficient width to accommodate not more than six tracks, and is to be constructed at such grade as not to require any change of grade on the surface of Eleventh Avenue north of 36th Street.

From the railroad yards near 60th Street the Railroad Company is to continue with not more than six tracks at their present grade to a point near where the prolongation of 122d Street would intersect the present tracks, from which point the tracks are to rise in grade so as to cross 129th, 130th, 131st, 132d, 133d, 134th and 138th Streets on a viaduct with a clearance of at least thirteen feet between the lowest portion of the railroad structure and the established grade of the streets above mentioned, the tracks to descend and to join the present grade of the tracks at about 145th Street; from this latter point not more than six tracks to continue at the present grade to Spuyten Duyvil, where they are to join the present main line.

At the present time the Railroad Company claims a right of way from about 73d Street to Spuyten Duyvil, 66 feet in width except where it is of greater width for the purpose of operating yards, and within this right of way at present operates from two to five tracks. The operating of six tracks will require a right of way of 90 feet. Within this new right of way the Railroad Company is to build walls on either side of the tracks having a height of at least eight feet above the base of rail—except for that portion of the road north of 72d Street where the viaduct above mentioned is to be built—that is, between about 125th and 145th Streets. The wall along the easterly side of the tracks is to be first built, and the westerly wall is to be built along such portions of the water front as the City has improved or shall hereafter improve, for either commercial or park purposes.

Footpath crossings are to be carried across and over the tracks along Riverside Park, as shall be required by the City, and road crossings at 79th Street, 96th Street, 155th, 158th Street and Dyckman Street, and such other streets as may hereafter be lawfully laid out and opened from 138th Street to Spuyten Duyvil by the City.

The expense of all such crossings is to be borne by the Railroad Company for such portion of the structure as lies within the 90-foot right of way, including the necessary abutments for the structure; the City to build the necessary approaches to the structure from the street, parks or marginal streets or wharves.

All changes in the City's sub-system of electrical conduits, sewers, water mains, &c., made necessary on account of the building of the subway, to be done by the Railroad Company at its own expense.

The Railroad Company is to file complete plans showing the layout, grade, &c., of the subway and the additional tracks to be built, such plans before becoming effective to be subject to the approval of the Board of Estimate and Apportionment and of

the Mayor of the City. These plans are also to show the changes made necessary in any established street and the necessary crossings referred to previously within park areas and the streets to be carried over the railroad right of way.

The Railroad Company further agrees to pay the sum agreed upon for compensation for the additional land or land under water required for the increase in width of the right of way from 72d Street to Spuyten Duyvil, such compensation to be fixed by the Board of Estimate and the Mayor of the City and the Railroad Company.

In regard to the time in which this work is to be done, a report has been submitted that all the work called for in this report could be completed within a period of four years from the date of the passage of necessary legislation empowering the work to proceed.

In the operation of the subway and main lines of track from Spuyten Duyvil to 30th Street, electrical operation is to be substituted for the present steam locomotives except in the case of breakdown or other emergency necessitating the operation of steam locomotives during such period of the suspension of electrical traction; except for the operation of the yards at 72d Street and in the vicinity of 154th Street, where, for an agreed upon period, it may be legal for the Railroad Company to operate the yards by means of steam locomotives.

It is further agreed that the disposition to be made of the Company's tracks south of 30th Street—which is a matter involving a number of other considerations than those that apply to the road north of that point—shall be the subject of further examination and discussion.

In order to carry out the plans thus far agreed upon it will be necessary to secure some additional legislation. Chapter 109 of the Laws of 1906, commonly known as the Saxe Law, directed this Board to prepare a plan for the removal of the tracks above referred to from the surface of the streets, and empowered the Board to make an agreement with any railroad company now operating a railroad by steam locomotive power in the Borough of Manhattan for removing its tracks from all streets upon which the railroad was operated at grade.

In accordance with the provisions of this Act, the Board will remember that its Engineer was instructed to make a careful study of the situation and to prepare such plans as the Saxe Law contemplated; and that Mr. Rice did, under date of November 14, 1906, present a comprehensive report, accompanied by complete maps, showing how the west side tracks of the New York Central Railroad could be removed from the surface of the streets by placing them in subways south of 59th Street. North of 59th Street Mr. Rice reported that the most practical way of avoiding any grade crossing of streets would be to have the tracks remain at their present elevation except at the crossing of Manhattan Valley between 129th and 138th Streets, where he proposed to elevate the tracks. At the other street crossings of this portion of the road he proposed to elevate the streets and have the same cross above the railroad tracks and go down on an incline parallel to the railroad until the level of the wharves or piers along the river front is reached. Mr. Rice pointed out also that the main object of the Act could thus be obtained and that an amendment to enable this to be done would not appear to be inconsistent with the purpose of the Legislature.

Mr. Rice's report also pointed out that while freight traffic could be handled in the subway it would be exceeding difficult to do so, that it would cause serious delay and that it would be enormously expensive.

The practical difficulties in regard to the handling of freight so as to run cars into

warehouses or on wharves or piers occur almost entirely south of the railroad yards on 30th Street, whereas the serious dangers to life in the use of the surface of the streets occur north of that point.

Having these facts in view, it is proposed to have a bill drawn which will authorize the carrying out of the tentative agreement above outlined, and will substitute for the rigid provisions of the Saxe Law authority, 1st, to construct the road north of 59th Street in the manner recommended by Mr. Rice; 2d, to postpone for the present the solution of the difficulty south of 30th Street; and, 3d, to add to the requirements of the Saxe Law the condition that electricity shall be substituted for steam for operating the road, with the exception already noted.

Your Committee thinks that the arrangement which they have outlined above ought to prove highly satisfactory to the Legislature and the public. If carried out, the plan proposed will solve the problem of removing the New York Central car tracks from the street surface all the way from 30th Street to Spuyten Duyvil—a distance of nearly ten miles. It will secure the placing of the road in a subway under Eleventh Avenue throughout the whole of the populous section from 30th Street to 61st Street. It will assure to the City the building (without cost to it) of adequate masonry walls on both sides of the tracks, along the Riverside Park and wherever else, north of the Manhattan Valley, such protection is desired. The use of steam will be abolished. A long, doubtful and extremely expensive litigation will be avoided. The difficult problem of handling the railroad traffic south of 30th Street will be put in the way of careful study and solution. And the Railroad Company will be enabled to purchase and construct adequate terminal facilities in Manhattan for conducting its freight traffic—a matter of the utmost consequences to the people of the City, whose welfare depends at least as much on the adequacy of the freight terminals as on the adequacy of the passenger terminals within its boundaries.

Dated, February 25, 1907.

GEO. B. McCLELLAN,
CHAS S. SMITH,
Special Committee.

The foregoing report was unanimously adopted by the Board. Prior to the Board's approval of a bill to carry the plan outlined in the report into effect, hearings were asked by various individuals or organizations and were granted, and several hearings were had. Upon the last hearing, March 14th, the bill, in the form of Senate bill No. 871 and Assembly bill No. 1621, both introduced March 18, 1907, was agreed upon by those present. The Railroad Company was not represented at any of these hearings, and certain provisions were inserted to which the Railroad Company was and is opposed.

The Railroad Company, however, is ready to stand by its agreement with the City authorities.

IMPROVEMENT OF THE TERMINAL FACILITIES
OF THE PORT OF NEW YORK

PRELIMINARY REPORT ON THE SUBJECT

BY THE

COMMITTEE

ON

FOREIGN COMMERCE AND THE REVENUE LAWS

OF THE

CHAMBER OF COMMERCE

OF THE

STATE OF NEW YORK

AND

MEMBERS OF THE CHAMBER ASSOCIATED THEREWITH

ADOPTED BY THE CHAMBER NOVEMBER 7, 1907

REPORT.

To the Chamber of Commerce:

At the regular meeting on January 3d, 1907, the Chamber adopted the report of the Committee on Foreign Commerce and the Revenue Laws on the terminal question, and referred it back to the Committee for further investigation, with instructions to report to the Chamber a comprehensive scheme for the future treatment and development of the waterfront, they being empowered to associate with themselves such other members of the Chamber as they might select for the consideration of the subject.

Your Committee, in accordance with the instructions and authority given to them, associated with themselves the following other members of the Chamber:

The Hon. JOHN A. BENSEL, Commissioner of Docks and Ferries.

Mr. PHILIP A. S. FRANKLIN, Vice-President of the International Mercantile Marine Company.

Mr. A. FOSTER HIGGINS, Chairman of the Committee on the Harbor and Shipping of the Chamber.

Mr. McDUGALL HAWKES, Vice-President of the Maritime Exchange and formerly Commissioner of Docks and Ferries.

Mr. FRANK BRAINARD, ex-President of the Produce Exchange.

Mr. FRANK S. WITHERBEE, of the firm of WITHERBEE, SHERMAN & Co.

Mr. ALFRED P. BOLLER, Consulting Engineer.

Mr. CHARLES A. SCHIEREN, ex-Mayor of Brooklyn and Chairman of the New York Commerce Commission.

and subsequently,

Mr. WILLIAM SLOANE, of Messrs. W. & J. SLOANE, Merchants.

Mr. ROBERT A. C. SMITH, President American Mail Steamship Company.

The Committee so enlarged have given the subject of the terminal facilities of New York City careful attention during the last ten months; they have held frequent meetings; have consulted various transportations, warehouse and mercantile interests; and have also personally visited and inspected parts of the waterfront.

As a result of their investigations your Committee find that the freight movement of this port has largely outgrown the facilities for prompt and cheap despatch; and it is not surprising that such is the case when the volume of New York's trade is considered, for the total value of foreign imports into the Port of New York has, during the last twenty years, grown from \$460,000,000 in the year 1887 to \$790,000,000 in the year 1906, while the exports from the Port of New York have grown from the sum of \$313,000,000 in 1887 to \$622,000,000 in 1906, both exports and imports representing only articles of merchandise and not specie and bullion. Perhaps equally significant is the growth of the tonnage registered, enrolled and licensed vessels belonging to the Port of New York, which have increased from 933,000 tons in 1887 to 1,571,000 tons in 1906. This includes all craft from steamships to lighters, and indicates the growth in water-

borne domestic and foreign commerce. The New York Commerce Commission, appointed by Governor BLACK to examine into the commerce of New York, the cause of its decline, and the means for its revival, in 1899 reported that the domestic water-borne commerce of the Port of New York was believed to exceed 100,000,000 tons, valued at \$7,000,000,000, and that it appeared to be increasing at the rate of 5% per annum. If this rate of increase remains operative the amount of water borne domestic commerce of this port can now be estimated probably to equal 150,000,000 tons of a value of close to \$10,000,000,000. The railroad traffic in freight landed and loaded in the Port of New York has increased materially, but statistics on this subject showing the total traffic of all the railroads are not obtainable.

Our facilities, as they exist today, are not equal to present demands, and the methods that were the outgrowth of conditions as they existed fifty or even thirty years ago are now in need of revision and modernization.

The increased difficulties attending the handling of the enormous growth in the import and export traffic of the Port of New York are particularly noticeable on Manhattan Island on which the congestion is greatest. The problems that surround the question of the terminal facilities on Manhattan Island can be summed up in this one fact: That the volume of freight business has increased enormously, while the lineal frontage has not grown in proportion; and the question is: How can this waterfront be rendered capable of admitting and distributing a larger tonnage of freight than is possible at the present time?

At a comparatively early period the neighboring shores on the East and North Rivers were utilized for the landing and shipment of freight, and the fact should be borne in mind that the Port of New York now comprises a large waterfront belonging to the State of New York other than Manhattan Island, besides a large portion of waterfront in the State of New Jersey. On the Long Island and Jersey waterfronts piers and warehouses were erected, and in the course of time have been materially extended.

Owing to the limited area and the high value of land on Manhattan Island there is now but little available space left upon the Island for the treatment of that portion of commerce which consists of bulky coarse goods, received for trans-shipment or storage. The economical handling of this class of goods needs close connection between the ocean carrier, the warehouse and the railroad carrier; and the land which is best adapted to meet these conditions, in the opinion of the Committee, is situated contiguous to or near Manhattan Island, to a considerable extent along the shores of Brooklyn, and also on the shores of Staten Island and New Jersey. On these extensive tracts of waterfront, adjacent to Manhattan Island, ideal conditions for the modern treatment of freight can be found, as space is there available for the construction of wide and long piers on which may be laid railroad tracks leading into warehouses on the land and to extensive switching yards providing facilities for making up trains, and for transfer of cars to railroads leading to all parts of the country. The advantage of this combination in the cheapening of the handling of this class of goods is patent; and, in the opinion of your Committee, the future development of the trade of New York in these bulky and coarse goods will be in this direction. The City of New York has recently taken steps toward the construction of a number of large piers, suited to modern requirements, on the Brooklyn waterfront, between 28th and 35th Streets, and between 58th and 61st Streets. This district is now within easy reach of Manhattan Island by municipal ferry from the Battery to 39th Street.

In the opinion of your Committee, it should only be the endeavor of the City, in the construction of pier terminals, to secure such improvement in the waterfront as cannot be carried out by private interests to any very great extent, so that its area of waterfront, which by nature is adapted for commercial uses, may be extended in its use by proper and harmonious development; but it is not, in the opinion of your Committee, the province of the City to provide warehouse accommodations in connection with such pier construction, as this would lead the City into a field that should properly be left to private enterprise. In the case of the new piers on the South Brooklyn waterfront, about to be constructed by the City, there is vacant land adjoining these piers belonging to the City upon which warehouses could be constructed by private capital.

Manhattan Island.—The commercial waterfront of Manhattan Island, south of 129th Street, is now practically entirely improved and occupied, its occupancy consisting in steamboat lines operating on coast, sound and river; railroad terminals and ocean steamship lines, both transatlantic and coastwise; and domestic services requiring proximity to markets, to building sites and exchanges.

The congestion of the waterfront, and of the streets on the waterfront and leading to the waterfront, has been the subject of frequent discussion and consideration. In 1897 a Commission of eminent engineers, appointed by the Mayor, proposed the construction of a four-track freight railroad along the North River front from the Battery to Christopher Street. It was proposed to keep the two middle tracks of this railroad open as main line to be operated by switching engines, no cars being allowed to stand on them. The two outside tracks were to be used for the purpose of allowing cars to stand on them, and the Board of Engineers explained that these car tracks should be so situated that cars on them could be approached by trucks or teams. Spur tracks were to be run from the outside track on the waterside to piers wherever desired by lessee, and similar tracks were to be run from the outside track on the land-side into adjoining property, whenever owners desired to use it in this way. It was the belief of the Board that recommended this plan that with this system there could be complete railroad communication effected with every pier on the waterfront, and that the blocks adjacent to the marginal way could be made available for freight stations and for warehouses into which the cars could be directly run. The Board further provided for an apron or landing stage at the Battery, adapted to a four-track transfer boat capable of carrying ten cars on each track, or forty cars in all, it being the intention of the Board of Consulting Engineers to take freight cars from all the trunk lines over this landing stage from the transfer boat to the railroad track and to effect their delivery on this four-track marginal railroad.

In the discussion that ensued it was conclusively shown by expert railroad engineers that this plan of the Board of Consulting Engineers was not practicable and would not, if introduced, be able to take the place of the method of freight transfer between the land carrier and the ocean carrier then and now in force. A freight railroad, properly to take care of the service required, would need large switching facilities, which could not be provided on West Street. It would be impossible to make up the trains needed for the various roads under these circumstances.

The waterfront of this harbor is so disposed by nature that facilities for transportation of freight by water, which always has been and probably always will be the cheapest form of transportation, are provided with the greatest prodigality. The re-

sult of the configuration of the Island of Manhattan has been the growth of an elaborate system of transfer of freight by water from railroad to ocean, domestic and inland water carriers, and *vice versa*, and it would be impossible successfully to replace such a cheap and rapid mode of transfer of freight between the rail and the water carrier by any other connection.

It has frequently been suggested as a means for the relief of the freight congestion on Manhattan Island that an elevated belt line around the City on its marginal waterfront might be devised, by means of which local freight arriving at the water's edge could be taken up at various stations and could be expeditiously handled, distributed and stored. An independent service of trolley freight cars would be needed for the successful operation of such an elevated belt line. This would involve unloading cars on their float at the water's edge, elevating the goods to the belt road, reloading on to elevated cars, which in small trains would distribute to the various warehouses or piers, when unloading and lowering of goods would have to be gone through to the street level. The reverse process would hold good for the treatment of goods to be shipped. It is evident that such a plan would require four handlings instead of one as at present, and while physically practicable, at the added cost of such handlings, which must be balanced against the cost of time of trucks waiting in line, often for hours, the cost of such a road would be very great, as expensive foundations would be required throughout the whole line. Your Committee, therefore, do not consider such a plan to be economically practicable at the present time.

The example of the City of Chicago, in creating a system of underground subways for the distribution of local freight, has frequently been referred to in the discussion of the question of the handling of freight. This system, while probably entirely practicable in Chicago owing to the geological formation on which the city rests and its general configuration, would not be feasible on Manhattan Island on account of the prohibitive cost of tunnelling attending the construction of the necessary subways and the totally different conditions obtaining here.

It does not appear to your Committee that, for the transportation of goods between the carriers on the waterfront and the interior parts of the City, there will be for some time to come any other mode discovered than by truck. Hence the congestion in the streets of the City, chiefly on and near the waterfront, caused by the transportation of goods by truck, presents one of the principal problems that has occupied the attention of your Committee.

The interchange of freight between the water carrier and the land carrier is now effected almost entirely by water transfer; and it does not now appear to your Committee that this system of transfer will ever be replaced by a transfer on land. The treatment of local freight discharged from or loaded upon the water carrier does not at the present time, in the opinion of your Committee, present opportunity for any immediate change in method, whatever the future development may show to be advisable and possible in economizing time and space.

Practically all the deliveries of the rail carriers on Manhattan Island consist of articles intended for the consumption, or use, or manipulation of the inhabitants of the Borough of Manhattan, while the shipments by rail from Manhattan to the interior of the country are brought in small lots from various parts of Manhattan Island. The

goods intended for delivery on Manhattan Island, and those taken by shipment from the Island, are discharged from or taken on cars on floats brought by the railroads to the piers now occupied by them along the waterfront. These cars, while on the floats, are discharged and freight is delivered or received on the piers and on the bulkhead along the waterfront. The growth of this business has resulted in great congestion along the waterfront of the lower part of the Island, a fact which needs no further argument, as all members of the Chamber are familiar with the great inconvenience and loss caused thereby to the merchants of this City.

The suggestion has been made that a remedy for the congestion on West Street and on the streets abutting on West Street, would consist in the removal of freight arriving by railroad car float across West Street at grade and under special regulations as to time to freight terminals on the east side of West Street, whence the goods could be taken away by truck to greater advantage and with less congestion, as four streets surrounding the freight station could be utilized—and this scheme was recommended by Mr. BUCHHOLZ, Chief Engineer of the Erie Railroad, in 1898. The plan proposed by Mr. BUCHHOLZ has been successfully put in operation above 23d Street, but on the greater part of the waterfront below that street it appears to be impracticable under present conditions, as there are no single block areas containing sufficient space for trackage apart from the enormous cost of the operating area. To obtain the required area at the street level for trackage and switching it would be necessary to close one or even two longitudinal streets, which is entirely out of the question.

By legislative enactment, the space from the west side of Pier No. 3 to the east side of Pier No. 8 on the East River, and from the north side of 51st Street to the south side of 54th Street on the North River, is reserved for the exclusive use and accommodation of canal boats and barges engaged in the business of transporting property on the Hudson River, and the space on the East River also for canal boats coming to tide-water from the canals of the State arriving in New York from Albany or any part or place north or west thereof during the period from March 20th to December 31st.

There is now great demand for more open piers for the accommodation of transient ocean and domestic water traffic. Provision should be made for as large a number of open piers as possible on the North River as well as on the East River front; and legislation should provide that, as the leases of piers expire, additional piers on the North and East Rivers, at frequent intervals, should be maintained as open piers.

The occupancy by the steamboat lines navigating the Sound of terminals on the North River front appears to be based upon the proximity of the principal shippers and consignees of the Sound Lines to that part of the waterfront. These interests have strenuously opposed the removal of the terminals of the Sound Lines to the East River front on account of the greater distance from their stores and warehouses. If this objection could be overcome the removal of the Sound Line terminals to the East River would not only release a number of piers on the North River front but would also remove an element of danger to navigation in the passage around the Battery and up and down the North River.

Your Committee, after considering the subject of the improvement and extension of terminal facilities, on which the future development and prosperity of the City and Port of New York are founded, are sensible of the fact that the subject is surrounded

with such complications and conflicting interests that they request the Chamber to consider this as a preliminary report, a final report to be rendered to the Chamber at a future time.

All of which is respectfully submitted.

(Signed,)	GUSTAV H. SCHWAB,	}	Committee on Foreign Commerce and the Revenue Laws.
	ISIDOR STRAUS,		
	GEORGE F. VIETOR,		
	CHARLES A. MOORE,		
	SILAS D. WEBB,		
	GEORGE GRAY WARD,		
	THOMAS A. PHELAN,	}	Members of the Chamber associated therewith.
	WILLIAM SLOANE,		
	ROBERT A. C. SMITH,		
	JOHN A. BENSEL,		
	PHILIP A. S. FRANKLIN,		
	A. FOSTER HIGGINS,		
	MCDUGALL HAWKES,		
	FRANK BRAINARD,		
	ALFRED P. BOLLER,		
	CHARLES A. SCHIEREN,		

NEW YORK, *October 31st*, 1907.

IMPROVEMENT OF THE TERMINAL FACILITIES
OF THE PORT OF NEW YORK

REPORT ON THE SUBJECT

BY THE

COMMITTEE

ON

FOREIGN COMMERCE AND THE REVENUE LAWS

OF THE

CHAMBER OF COMMERCE

OF THE

STATE OF NEW YORK

AND

MEMBERS OF THE CHAMBER ASSOCIATED THEREWITH

ADOPTED BY THE CHAMBER, JANUARY 2, 1908

REPORT

To the Chamber of Commerce:

Your Committee presented a preliminary report on the improvement of the terminal facilities of the port of New York on November 7th last, and have since given the subject assigned to them further careful consideration.

It appears to your Committee that an amelioration of the congested condition of the North River water front could be found in the construction of long piers suitable for modern requirements north of Twenty-third Street. Most of the piers in this locality are small and short, and unsuitable for present requirements. This improvement cannot be made by the extension of the piers owing to the fact that the pier head line, established by the War Department, would not permit it. To render possible the improvement of this part of the water front, the pier head line north of Twenty-third Street should be extended so as to permit of the construction of piers as nearly as possible 800 feet in length. As the width on the Hudson River between the present pier head lines on the New York and the Jersey shores is 2,800 feet between Twenty-third and Thirtieth Streets, and 2,900 feet on an average between Thirtieth and Fiftieth Streets, it does not appear that the small contraction of the river width through the extension of the pier head line would be sufficiently great in any way to endanger navigation. If this extension of the pier head line were made, a large number of piers north of Twenty-third Street could be built of a length of 800 feet, which would materially increase the pier capacity for discharging and loading the largest liners.

Piers of requisite length could be rendered possible by excavation of the land instead of by further extension into the river; but, in view of the great and increasing value of Manhattan Island real estate, such a course would result in a prohibitive cost and add to the congestion on Manhattan Island; and it would appear that the rental, representing a certain return on the cost of the improvement, would be higher than most vessels could pay. The consequence of the construction of such expensive piers would be prejudicial to our trade, both foreign and domestic.

Your Committee, in view of the great interests affected and the increasing congestion of the North River water front, respectfully recommend that the Committee on the Harbor and Shipping of the Chamber be requested to endeavor to secure from the War Department the extension of the pier head line above Twenty-third Street to permit of the construction of piers 800 feet in length, enlisting to this end the co-operation of other commercial organizations of New York.

Another remedy that suggests itself to your Committee, consists in the commercial development of the East River water front above the Navy Yard. Your Committee point to the fact that the water front of the East River above the Navy Yard would be capable of accommodating domestic and ocean traffic to a larger extent than at present, and that the upper reaches of the East River at its entrance into Long Island Sound would be susceptible of development and utilization for terminal purposes, if the obstructions that render the navigation of the East River, and of the approach to it through Hell Gate, hazardous and their navigation dangerous, were removed, and the crooked and narrow channel were straightened, widened and deepened, permitting the free entry from Long Island Sound into the East River of large ocean going ves-

sels. The East River would then present greater attractiveness as a region of terminals for ocean and domestic commerce.

Aside from the greater opportunities that would accrue to the East River district by such improvement of the East River and its connecting links, the fact has been brought to the attention of your Committee that the steamship lines operating between New York and the Eastern States alone now carry 2,500,000 tons of manufactured and high class goods per year, while the number of passengers carried on these lines through the dangerous and tortuous channel now traversed between the East River and Long Island Sound is 1,500,000 per year. There is besides the tonnage carried by these steamship lines a large and important traffic in coal, stone, gypsum and ice transported through Long Island Sound, amounting to about 11,000,000 tons, besides 280,000,000 feet of lumber per annum, which would be benefited and would rapidly develop if the channels in the East River and through Hell Gate were improved.

Although not within the province of this Committee, the fact should be pointed out that, from a military point of view and with regard to the proper defence of this important harbor, the necessity for another channel giving access to the harbor through Long Island Sound, in addition to the southern approach by way of Sandy Hook, cannot be too strongly urged.

A Bill has been introduced in the House of Representatives by Mr. GOULDEN, H. R. 4039, providing for the appropriation of \$500,000 for the improvement of the East River. The total amount required adequately to widen and deepen the channels of the East River will very much exceed this amount with which it is proposed to begin to work upon the much-needed improvement. Your Committee respectfully recommend that the Committee on the Harbor and Shipping be requested to take such steps as they may deem advisable to urge upon the Committee on Rivers and Harbors, to which this Bill has been referred, its favorable consideration and its ultimate passage by the Congress, and to this end to enlist with it the co-operation of other commercial bodies of New York City.

In their preliminary report your Committee emphasized the need for more open piers, covered or uncovered, for the accommodation of transient ocean and domestic freight traffic as distinguished from leased piers. The demand of the shipping interests for a greater number of such piers is insistent, and, in the opinion of your Committee, must be recognized. These interests point to the fact that there is at the present day not an entire open pier on the North River front between the Battery and Thirtieth Street, the only pier wharfage left in this section consisting of the north half of a narrow pier at the foot of Canal Street with a small slip. On the East River there are at present six open piers between the Battery and Corlears Hook.

In their report to the Chamber of April 3, 1905, the Committee on the Harbor and Shipping estimated the total transient trade, namely the Australian, China, West Indian and fruit trade, which is involved, at 520,000 tons, to which should be added the enormous tonnage of domestic inland commerce in cement, brick, iron, coal, etc., which requires accommodation on the water front. The Committee on the Harbor and Shipping in their report continued as follows: "The several piers now open on the "upper East River and the piers available for business use on the upper part of the "North River are now entirely too few to care for the local trade demanding dock "facilities at these points, and to attempt to force the transient trade of this port, "together with the local craft laden with merchandise for the lower part of New York,

"to the upper section of this City, would simply make the unsatisfactory conditions now prevailing much worse, and would result in a most chaotic state of affairs for all concerned."

There are two policies on which the water front of Manhattan Island can be managed—either solely as a source from which the City must derive as large an income in the shape of pier rentals as possible, or as a means for the accommodation of commerce. The Chamber has repeatedly recorded its emphatic opinion that the first consideration should be the safeguarding and extension of the foreign and domestic trade of this City, and that the policy of the City with regard to its water front should be shaped accordingly. In the interest of the conservation of a large part of our commerce, it appears to your Committee, therefore, necessary that the City should grant certain limited accommodation as open piers to these trades that demand consideration, without which consideration they would suffer or would seek other markets, and the City should willingly submit to the loss of revenue involved in these cases. Under the present law, Chap. 635 of the laws of 1906, the Commissioner of Docks and Ferries is enabled to set aside piers as open piers, and your Committee recommend that the Chamber instruct its Committee on the Harbor and Shipping to prepare resolutions for adoption by the Chamber urging upon the City authorities that at least one open pier on the North River between Chambers Street and the Battery, one additional open pier on the East River between Market Street and the Battery, and one open pier on the Brooklyn water front be provided, and to invite the co-operation of other Commercial and Maritime Associations of New York City in taking up this question with the City authorities.

The completion of the work of enlargement and improvement of the State canals now in progress is so far distant in point of time that it would be impossible, in the opinion of your Committee, at the present day to formulate any plan for proper terminals to accommodate the increased traffic that is expected when the improved canals are in operation. It is to be presumed that transportation methods through the enlarged canals will undergo considerable change compared with present conditions; and, until these changes are more clearly defined, any plans for terminals would appear to be premature. It would, however, appear to be probable that the increased canal traffic will require additional open piers in certain districts of the water front; and the policy of the City should, therefore, in the future be steadily to add to the number of open piers as leases of piers expire.

In their preliminary report, your Committee drew attention to the fact that, under the conditions prevailing in the Port of New York, bulky coarse cargoes had to a certain extent left the Manhattan Island water front and were now more economically and more efficiently treated on adjacent shores. Your Committee also expressed the opinion that this tendency would increase as the water front of Manhattan Island became more valuable for other terminal purposes.

In this connection your Committee referred to the water front improvement planned by the City in South Brooklyn, in which location the City will be able to provide nine large piers, 150 feet wide and more than 1,000 feet in length with slips between the piers of 250 feet in width, besides one smaller pier 60 feet in width, for the accommodation of ocean vessels. On the completion of this improvement, there will be in this section, between Twenty-eighth and Sixty-first Streets in South Brooklyn, sixteen large piers and one smaller pier, partly owned by the City and partly by a

Terminal Company. It appears to your Committee of the greatest importance that the development of the entire property to be acquired by the City in this section should be homogeneous and that the upland part should be used for terminal purposes in connection with the piers. If sold by the City without regard to its use in connection with the terminal piers of which it is part, the property would become alienated and the history of West Street, Manhattan, would be duplicated on the South Brooklyn water front. Your Committee, therefore, respectfully urge that the treatment of this upland property by the City should be in the direction solely of its usefulness for terminal purposes. The City could either develop the upland property by leasing it under restrictions, limiting it to terminal purposes, or it might be able advantageously to arrange an exchange of this upland property for pier property. As Section 76 of the City Charter authorizes the sale by the City of upland property not needed for public use, with the approval of the Sinking Fund Commissioners, and Section 822 permits the purchase of piers, also with the consent of the Commissioners of the Sinking Fund, authorization by special legislative enactment does not appear to be necessary. Your Committee recommend that the Committee on the Harbor and Shipping take this subject into consideration and address a memorial to the City Authorities in the premises.

Your Committee, in presenting these suggestions and recommendations of possible remedies for the relief of terminal conditions as they now exist in this port, regret that they have been unable thus far to discover any method by which the traffic congestion in the marginal streets on the water front might be relieved. This, in the opinion of your Committee, is a subject which is properly part of the problem of the regulation of street traffic, a problem rendered especially difficult by the configuration of Manhattan Island, and by the constantly increasing volume of business transacted in its limited area.

All of which is respectfully submitted.

(Signed,)

GUSTAV H. SCHWAB,
THOMAS A. PHELAN,
SILAS D. WEBB,

} *Of Committee on
Foreign Commerce
and the
Revenue Laws.*

JOHN A. BENSEL,
ALFRED P. BOLLER,
FRANK BRAINARD,
ROBERT A. C. SMITH,
CHARLES A. SCHIEREN,
WILLIAM SLOANE,
A. FOSTER HIGGINS,
PHILIP A. S. FRANKLIN,
McDOUGALL HAWKES,

} *Members of the
Chamber
Associated
therewith.*

NEW YORK, December 27, 1907.

EXTRACT FROM

REPORT OF THE PUBLIC SERVICE COMMISSION FOR THE FIRST DISTRICT OF THE STATE OF NEW YORK FOR THE SIX MONTHS ENDING DECEMBER 31, 1907, RELATIVE TO THE TRACKS OF THE NEW YORK CENTRAL AND HUDSON RIVER RAILROAD COMPANY ON THE WEST SIDE OF THE BOROUGH OF MANHATTAN.

Eleventh Avenue. Under the terms of the Saxe law as to the removal of steam railroads from streets in Manhattan, applying especially to the tracks of the New York Central, it devolved upon this Commission to cause condemnation proceedings to be instituted. The Rapid Transit Commission had failed, within the year fixed by the act, to reach an agreement with the company for the depression of the tracks, and condemnation of the rights of the company in the streets thereupon became mandatory. This Commission has caused to be prepared lists of permits granted by the local authorities for switches and connections, and has requested the Board of Estimate and Apportionment to revoke such permits. Subsequently maps were completed and the Corporation Counsel of the city formally directed to commence condemnation proceedings. This ends the duties of this Commission under the act. It has been conscious, however, of the fact that the public expects a practical solution to this perplexing problem, and it has therefore made a careful study of the entire problem, but is not ready as yet to make definite recommendations.

E. WEST SIDE TRACKS, ELEVENTH AVENUE.

The New York Central tracks on the surface of the west side of the borough of Manhattan should be removed. In 1846 the Legislature granted a charter to the Hudson River Railroad Company with power to construct a railroad on any of the streets or avenues of the City of New York west of Eighth avenue and on or westerly of Hudson street. This was followed by ordinances of the city of New York granting to the railroad company permission to construct a double track of rails with suitable turnouts along the line of the Hudson river from Spuyten Duyvil creek south through certain streets to Chambers street, and subsequently to Broadway at Warren Street.*

The Saxe Law.—This subject has been a pressing one before the Commission because the so-called Saxe law (Laws of 1906, chapter 109) imposed upon the Board of Rapid Transit Railroad Commissioners the duty of endeavoring to make an agreement with the railroad company to do away with operation at grade and to construct a subway south of 59th street, and in case such an agreement should not be entered into before the expiration of one year from the passage of the act then the Board of Rapid Transit Railroad Commissioners was directed to condemn all the rights, privileges and franchises of the railroad company across, through or along the streets, public parks or places. The year specified in the law expired before any contract was made, the date of expiration being March 26, 1907.

It therefore became necessary for this Commission, following the plain direction of the law, to begin condemnation proceedings. The Commission early started a careful and exhaustive research to ascertain and compile the laws, franchises and permits

* The first ordinance, dated May 6, 1847, authorized the construction of the railroad from Spuyten Duyvil creek as far south as Canal Street. The road was extended through Canal and Hudson Streets down to Chambers Street under authority of an ordinance dated September 25, 1849. Chapter 216 of the laws of 1846 and the ordinances of May 6, 1847, and September 25, 1849, constitute the authority for the main stem of the road as it exists today. By an ordinance dated December 20, 1864, the railroad was authorized to extend its tracks from Chambers Street, through College Place and Warren Street, to Broadway, "for the use of their city cars." Subsequently by additional ordinances, authority was granted to construct various tracks, spurs, switches, sidings and turnouts to be operated in connection with the main stem of the railroad. Today the company has no tracks south of its freight depot at Beach and Hudson Streets.

which have been passed or issued. Surveys were made to determine what tracks were laid in conformity therewith, what tracks, if any, were laid without sanction of law, and what rights existed that were not used. All of these facts have been brought together in reports and maps. Condemnation maps have been prepared and duly transmitted to the corporation counsel of the city of New York, as he is the person designated by law to take charge of condemnation proceedings initiated by this Commission. All subsequent steps, therefore, are to be taken by the corporation counsel. It should be added that a provision in the Saxe law allows this Commission to discontinue the condemnation proceedings at any time before the confirmation of the final report of the condemnation commissioners.

It was discovered that some of the tracks, especially spurs leading into private grounds for business purposes, were laid under many revocable permits granted by the city of New York. These were collated and a list thereof transmitted to the Board of Estimate and Apportionment and to the corporation counsel with a suggestion that they should be revoked at a suitable time so that there would be no danger that the condemnation commissioners would place a valuation upon them.*

Methods of Relief—Eleventh Avenue.—From the foregoing it will be seen that the mandatory provisions of the law have been complied with. But some method of sinking or elevating these tracks must be found. For many years the situation has been growing worse and worse. Children are killed, needed streets are rendered almost impassable, traffic is constantly impeded by freight trains, and a large portion of an important section of the city finds its progress retarded. The probable award on condemnation would impose a serious burden of payment upon the city, and moreover some railroad access to the westerly part of the city to bring into market produce, meat, milk and merchandise, is desirable. The solution, therefore, rests rather in the replacement of the tracks than in their entire removal.

An elevated freight railroad through Eleventh avenue is undesirable. All of the objections that are made against a passenger elevated road apply to a freight elevated railroad, and on account of switches for sidings, a freight elevated would be even more objectionable. The alternative, as far as Eleventh avenue is concerned, is a subway for freight purposes. When, however, it is considered that it is very difficult to introduce sidings from the street surface into a freight subway, that it is very expensive to enlarge it for future needs, and if constructed at the expense of any private company, the com-

*PERMIT.	GRANTEE.	DATE OF PERMIT.
No. 1.....	Hudson River Railroad Co.....	December 17, 1874
No. 2.....	New York Central and Hudson River Railroad Co.....	December 27, 1897
No. 3.....	New York Central and Hudson River Railroad Co.....	November 4, 1897
No. 4.....	Kilpatrick & Roylance.....	June 22, 1896
No. 5.....	John Glass.....	December 21, 1893
No. 6.....	John Glass.....	July 9, 1888
No. 7.....	Gansevoort Freezing & Cold Storage Co.....	April 10, 1888
No. 8.....	Adams & Co.....	November 3, 1899
No. 9.....	Genesee Fruit Co.....	March 19, 1891
No. 10.....	Sanderson & Co.....	June 6, 1899
No. 11.....	Atlantic Transport Co.....	December 27, 1899
No. 12.....	Booth & Edgar.....	April 11, 1878
No. 13.....	N. Y. C. & H. R. R.R. Co.....	December 4, 1874
No. 14.....	N. Y. C. & H. R. R.R. Co.....	October 31, 1890
No 15.....	N. Y. C. & H. R. R.R. Co.....	December 31, 1890
No. 16.....	John M. Mueller.....	April 28, 1872
No. 17.....	A. M. Allerton, Jr. & Co.....	January 5, 1859
No. 18.....	H. M. Kuhnast.....	January 30, 1897
No. 19.....	American Express Co.....	May 21, 1856

pany would demand some very valuable concession in return, a conclusion in favor of a freight subway through Eleventh avenue is open to serious objections. The New York Central Railroad Company has been willing to build at its own expense a freight subway from Fifty-ninth street to Thirtieth street, but only on the condition that it should have a franchise for four extra freight tracks from Spuyten Duyvil creek to Thirtieth street and the perpetual and exclusive ownership of these rights. The city itself would hardly want to build a *freight* subway through Eleventh avenue, because not only would the cost be great, but as it would be distant from the water front it would only be used by the New York Central Railroad.

Waterfront Transportation.—If it should seem unwise to place a freight line either below or over Eleventh avenue, the alternative would be the North River water front. The city now owns the so-called marginal way practically all of the distance so that it would not be necessary to construct the elevated road on West street, but the entire structure could be between West street and the piers. It would seem proper that the elimination of the west side surface tracks of the New York Central Railroad should have some relation to the piers. We are inclined to concede that the present pier uses are such that there is no great demand for freight car connections. These docks are more and more used for passenger and package freight. Freight intended for the interior can be cheaply lightered to railroads. Nevertheless, there is no doubt that an elevated freight road along the river front would sometime be of advantage to shippers. Such a road could be connected with the piers by spurs, and also with every freight-yard, depot, and factory on the west side.

A subway along the west side would be useful mainly for freight purposes because necessary switches and cross-overs would make it difficult to operate fast passenger trains on the same grade. If a passenger level were placed under the freight level, there would be difficulties due to depth and the presence of the freight line between the passenger stations and the surface. On the other hand an elevated structure along the water front might be so built as to provide for passenger trains, and later an upper level might be added. The saving in cost of an elevated structure over a subway of equal capacity would be very great. Nor can it be said that the appearance of the water front would be greatly injured. Artistic and heavy construction could be employed.

The part of the west side surface tracks that now cause the most trouble and danger is on Eleventh avenue between Fifty-ninth street and Thirtieth street. The company has large yards at each of these points. The first construction work should be either the lowering of the tracks into a subway on Eleventh avenue or removing them to an elevated structure between these points along the piers. The number of cars that proceed south of Thirtieth street is comparatively small.

Franchise Terms.—If the state of the city's finances would allow it, it would probably be wise for the city to build and own an elevated freight railroad along the Hudson river piers. This could be made accessible not only to the New York Central railroad but to the Pennsylvania by an incline from its tunnel and to all the other railroads by floats. Its earning ability would constantly increase and in time it would become a valuable asset to the city. While, however, the need for passenger rapid transit lines is as pressing as at present, there is little hope of the city erecting a municipal water front road for freight. The best available plan would seem to be to let some company build it at its own expense—the New York Central if it would undertake the work on more favorable terms than anyone else. An arrangement might be made analogous to

that made by the authorities for the continuation of the McAdoo tunnel route through Sixth avenue to Thirty-third street, which was substantially that the city could buy at its then value at any time after twenty-five years and in the meantime a fair consideration was made payable to the city for the franchise privileges.

Progress Made.—This Commission has since its beginning been working constantly upon this difficult problem of the west side tracks. It has brought together all available information. Its committee has by conferences and hearings endeavored to learn the views of the many organizations interested in the port, the city at large, and the immediate locality. It should, however, be frankly admitted that the Commission has not yet been able to arrive at any conclusion entirely satisfactory or that can be confidently affirmed to be the best. Inasmuch as the Saxe law did not authorize this Commission to do anything further than to begin the condemnation of the franchises, which it has done and further legislation will probably be needed to procure a new method of freight transportation for the west side, it might perhaps be considered that the Commission could properly await further directions from the Legislature. But as the problem involves so many questions that are properly cognizable by this Commission, and as so many complaints against the present operation are being received at its offices, and as the correct solution is so closely linked with the rapid transit problem, there will be no cessation of its work upon this question.

Line North of Seventy-second Street.—The treatment of the New York Central railroad tracks north of Seventy-second street should be largely from the landscape point of view. To-day they are a disfigurement to the most beautiful water front that New York city possesses, lying as they do between the park system and the Hudson river. Riverside Park should be extended in places over the track which would run in an open arcade. Parts of the roof might contain greensward or shrubbery and would thus be a valuable extension of the park area. It would be necessary to cross Dyckman street and the valley at One Hundred and Twenty-ninth street by elevating the grade of the railroad tracks. The roofing of the tracks at intervals would render accessible the strip on the edge of the river now owned by the city, and which could readily be filled in for a play ground. The New York Central Railroad Company desires to obtain room for from two to four additional tracks. These, if allowed, should be between the present tracks and the river. Some fair arrangement should be made between the city and the railroad company so that the railroad company should pay for all or part of the covered arcade as a consideration for the granting of extra trackage rights or space.

In general this plan contemplates the utmost utilization for commercial purposes of such trackages as may be allowed south of Seventy-second street and the beautification of the trackage area north of Seventy-second street. Neither of these purposes is accomplished now. When the unsightliness, danger, and inconvenience of the west side tracks are abolished a vast area of the city now retarded in its progress will be given an opportunity to attain the position of importance that its location deserves.

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